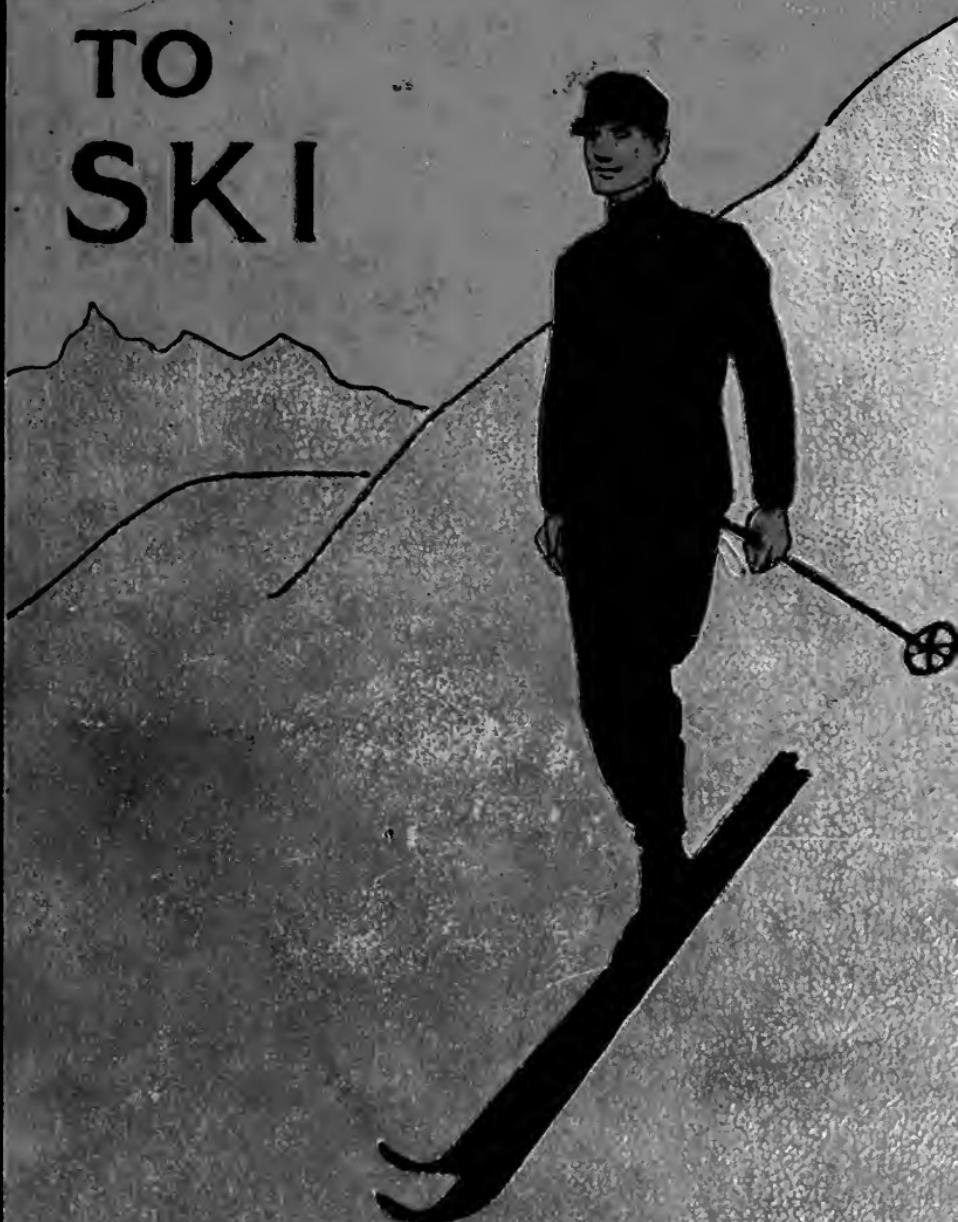


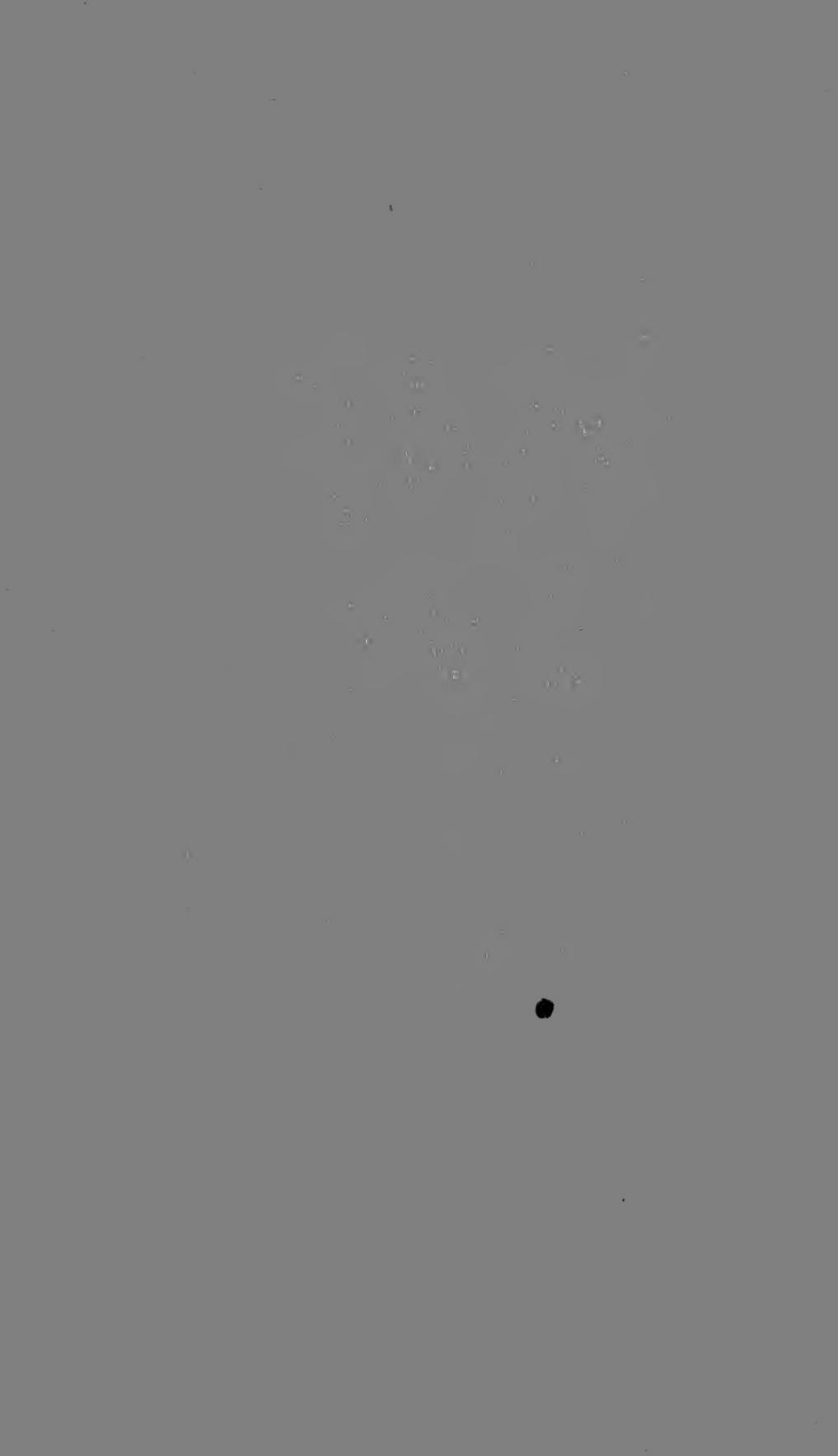
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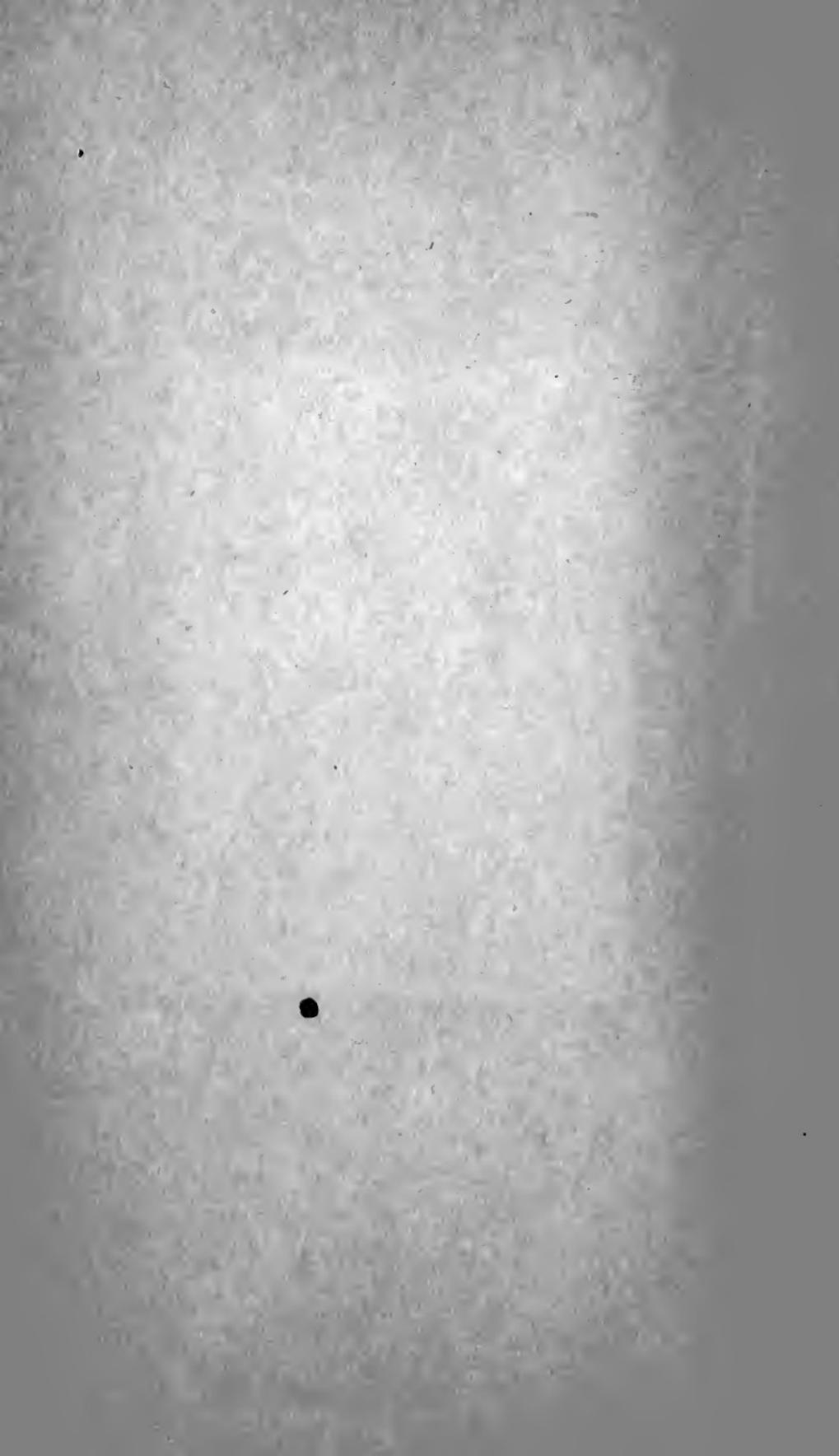


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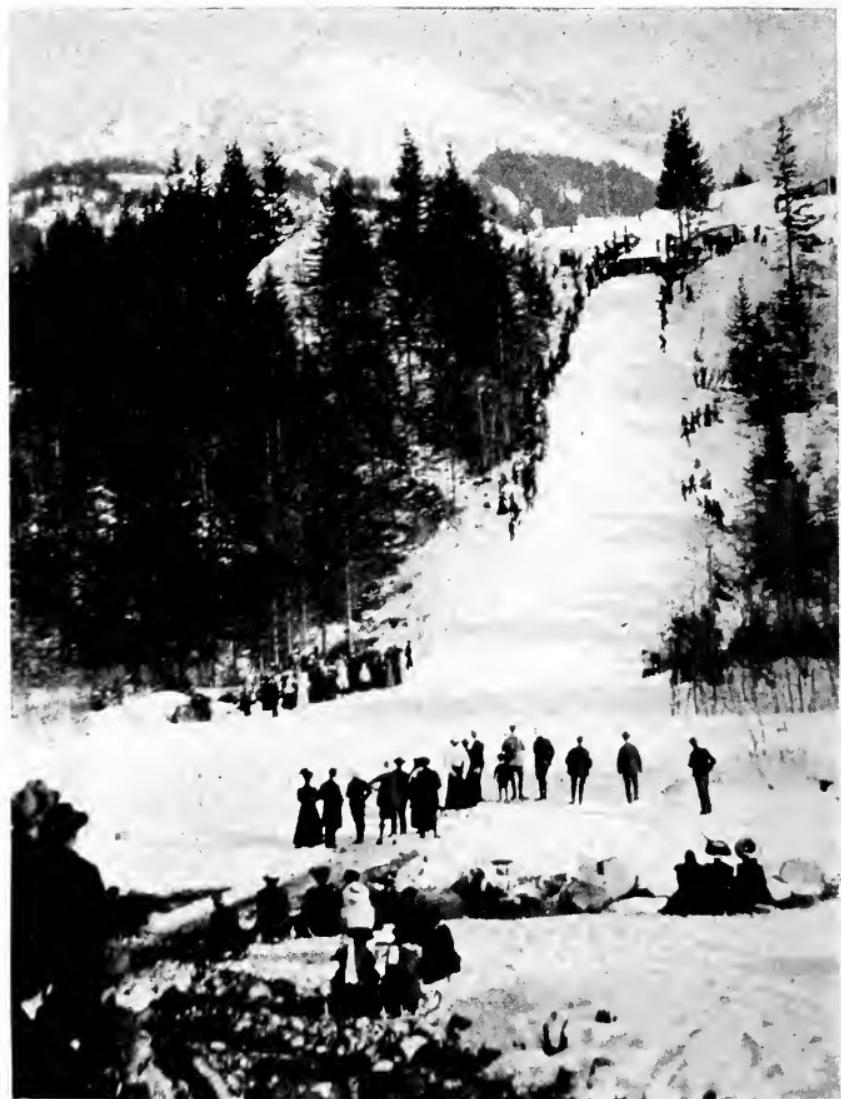


Photo by

Miss E. Frisby.

The Adelboden Jumping-hill.

Frontispiece.

HOW TO SKI

AND

HOW NOT TO

BY

VIVIAN CAULFEILD

PHOTOGRAPHS BY K. DELAP

THIRD AND REVISED EDITION



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PREFACE TO REVISED EDITION

THE alterations and additions to this book in its present form are due partly to fresh practical experience ; partly to adverse criticism of which I now see the justice ; and partly, as I freely admit, to the picking of other people's brains. Since this book was published I have read for the first time books on ski-ing by Zdarsky, Bilgeri, Luther, and Arnold Lunn, and have re-read those of Richardson, Rickmers, Paulcke, and Hoek. As a result I have had to alter a good deal of my theory and some of my practice, and to alter and enlarge this book accordingly. To all the above-named authors, therefore, I am more or less indebted, and feel correspondingly grateful.

In adopting an idea one can seldom help altering it more or less, and if in the body of the book I have made few direct acknowledgments, it has been from no lack of gratitude, but rather from a doubt whether the originator of the idea would be gratified at its development or indignant at its distortion.

I must however make special acknowledgments

to Ober-Leutnant Bilgeri. From his excellent book I have gained much fresh knowledge of the theory and practice of ski-ing. This book, moreover, while confirming me in my opinion of the vices of the Lilienfeld system of *ski-running*, has given me a fresh insight into the virtues of the Lilienfeld system of *teaching*, and consequently a fresh sense of my indebtedness to the chief apostle of this system, my first teacher, Mr. Rickmers.

If Herr Bilgeri has ever happened to read my book, certain resemblances between it and his own—the analogy of the bicycle and tricycle with the single and double-track runner, for instance—may, since his book was published first, have struck him as remarkable. I take this opportunity of assuring him that when I wrote this book I had not read his, nor for that matter any of his writings, and that, if I had, the resemblances would have been not only fully acknowledged, but considerably more numerous.

To Mr. E. C. Richardson I must return special thanks for criticism that has shown me the error of some of my ways of thinking; I have also to thank Mr. C. W. Richardson for new ideas gained from an article by him on “Knee Action in Ski-ing.”

Finally, I wish to express my gratitude to everyone whose suggestions I have adopted, or

who, either by precept or example, has taught me anything new and so has had a hand in the revision of this book, but to whom I have not referred individually.

This heavy list of acknowledgments makes me realise more than ever how difficult it is nowadays for a writer on ski-ing technique—or at any rate for *this* writer—to say anything new. I am afraid that even a *succès de scandale* as the fanatical prophet of complete sticklessness will soon be out of my reach, if it is not already, for we are all agreed now that the stick should be used as little as possible, and therefore that not to use it at all is, if possible, best. It is a short step from this to finding out by practical experience that, so long as one is travelling on *snow*, not *ice*, and has a little more than room enough to place the skis horizontally across the slope, one can move just as freely, quickly, and easily, and with just as perfect control, without the stick as with it.

E. V. S. C.

December 1912.

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HOW TO SKI

INTRODUCTORY

THE ENGLISHMAN AS A SKI-RUNNER

PROBABLY every one likely to read this book knows that a ski is a snow-shoe or skate, and that it is a long narrow plank turned up in front, but he may not have a very clear idea of the use of it.

It may not have occurred to him, for instance, that in a country which is deeply covered with soft snow (the surface of snow is sometimes a hard crust) a man without snow-shoes of some kind is not merely unable to move quickly, but is unable to move at all outside the cleared roads and beaten tracks.

Merely to prevent sinking into the snow the ski is just as useful as a snow-shoe of the racquet form, such as the Canadian, and it is never *less* useful than the other even when it seems most likely to be. For moving through dense under-wood, for instance, when its length would appear

HOW TO SKI

likely to be awkward, or for hauling sledges, when its slipperiness would seem a disadvantage, experience shows that the ski is fully as useful as the other type.

As a means of locomotion it is altogether superior. Over level open country a man can slide along on skis a great deal faster than he can walk (or run) on Canadian snow-shoes.

In hilly country the ski-runner has a further advantage. If a hill is not steep a man may walk straight up it on racquets rather more quickly than a man on skis can climb it by zigzagging (as he is obliged to do on all but the most gradual slopes); but on the descent the ski-runner more than makes up the time he has lost; for, helped by gravity, he slides down the hill at least three, perhaps as much as thirty, times as fast as he climbed it, according to his expertness and the nature of the ground, while the other takes almost as long to *walk* down as he did to *walk* up.

On very steep ground the ski-runner has a still greater advantage, for here the narrowness of the ski allows him to move across the steepest snow slopes with little or no discomfort to his ankles, while on a steep slope the man on racquets is practically helpless, for, on account of

their shape, it is only with the utmost difficulty, if at all, that he can move either up, down, or across the hill.

A moderately expert ski-runner can manœuvre on any sort of ground which is covered with snow, provided that the surface of the snow be not so hard that the edges of his skis can make absolutely no impression in it. The steepness of a slope, no matter how great, is in itself no obstacle to his manœuvring with perfect freedom ; it need only be reckoned with in so far as it relates to the danger of avalanche.

This should give some idea of the scope of ski-running considered merely as a means of locomotion.

With regard to the possibilities of ski-running considered purely as a sport, it may be said that a good runner, descending a steep hill where the ground is open, will often cover a considerable distance at an average rate of 45 miles an hour : that when moving at half that speed he can thread his way among obstacles or stop suddenly ; and that the present record for a jump on skis is about 154 feet. I need hardly say, therefore, that the opportunities afforded by the sport for the exercise not only of the runner's nerve, but of his skill and judgment are almost unlimited.

HOW TO SKI

Now it is only by learning the best methods and style at the very outset (or by changing them if he has started with bad ones) that a man can develop to the utmost whatever latent capacity for ski-running he may possess, and only in this way that he is ever likely to become expert enough to have any right to the title of a good runner.

At this point I had better, for the benefit of those readers who have already used skis, give some sort of definition of good ski-running as I understand it.

It is not quite easy to do so, but I take it that the best judges would hardly call a man a good runner unless he could run steadily, quickly, and easily down any hill on which skiing was possible at all—no matter how difficult the ground might be as regards obstacles, gradient, and condition of snow—*without ever using his stick as an aid to the balance or for steering, or, except on the very rarest occasions, for helping him to slow up or stop*; and unless he could, on an ordinary jumping hill, make jumps of fair length without falling very often.

Such a man would probably be able to make, in that kind of snow which is appropriate to each, all the swings and turns to either right or left

while running at a good speed, and would almost certainly both run and jump in really good style.

A good runner, indeed, can nearly always be recognised by his style, although, of course, a man cannot be called a bad runner, however bad his style, if he is really fast and steady downhill, and can make long jumps with certainty. But a ski-runner with a bad style is below his proper form ; if, with a bad style, he is fairly fast and steady, and is good at jumping, he would with a good style be exceptionally so.

Among the Scandinavians or the best continental runners, no one would be considered at all good on skis unless he more or less fulfilled the above definition. Among English runners, I am sorry to say, the standard, not only of performance, but of criticism, is far lower, and although there are by this time many Englishmen who are capable tourists and mountaineers on skis, there are almost none who can be called good runners in the above sense, or who can be compared with the best continental runners even, while to compare them with the best Scandinavians would be ludicrous.

Among the English at Swiss winter-places a man is often spoken of as "good at ski-ing" for no better reason than that he spends most of his

time on skis and has climbed several hills on them, or has crossed several passes; while if it is known that, as a rule, he gets through a day's run without falling, he is sure to be considered a most accomplished ski-runner. Quite as reasonably might a man gain a reputation for fine horsemanship simply through being able to make long journeys on horseback without falling off or getting exhausted. Just as the latter may easily be a poor horseman, so may the former be a very poor ski-runner; the fact that he may happen to be a great mountaineer gives him no more claim to the title of a fine ski-runner than does the fact of his being a fine ski-runner to the title of a great mountaineer.

If asked his opinion of some such champion, a good Swiss runner will usually answer tactfully, "He is good, for an Englishman." The full value of this compliment can only be appreciated by some one who, like myself, has overheard Swiss runners criticise an exhibition of unusual awkwardness and timidity on the part of one of their own countrymen in the words, "He runs like an Englishman."

It would be very nice to think that jealousy of our prowess in ski-ing made them talk like this, but that, unfortunately, is out of the question.

The fact is that most English runners seem to be perfectly contented with just so much skill as will enable them to get up and down a hill at a moderate speed and without many falls. Having acquired this, they give up practising altogether, and devote the rest of their ski-ing lives to making tours, never attempting to become really fast or skilful runners or to go in for jumping, even in its mildest form.

It is rather curious that this should be the case, for most English ski-runners are young and active men, accustomed to other sports and games, who, I suppose, take up ski-running at least as much for its own sake as with the object of using it as an aid to mountain-climbing and touring.

Surely, then, one might reasonably expect that a fair number of them would become really fine runners, that nearly all of them would try to, and that even those who had no ambition to excel in the sport for its own sake would be anxious to increase their efficiency as mountaineers or tourists, and would therefore, at the very least, try to run in good style; for good style, in ski-running as in every other game or athletic sport, means economy of muscular force, which is surely an important consideration to the mountaineer.

Most good Swiss runners, I am sure, think

that the Englishman is constitutionally incapable of becoming really good on skis. To me, at any rate, it is by no means surprising that they should think so, for, taking any average pair of ski-runners, Swiss and English, who are about equally matched in age, physique, and ski-ing experience, even if there be little to choose between them in the matter of skill, there is in one respect a very marked difference—the Englishman nearly always running more slowly and cautiously and altogether with less dash than the Swiss. In fact, not to put too fine a point upon it, the Englishman, as compared with the Swiss, generally shows what an unsympathetic critic might call a distinct tendency to funk.

How English and Swiss ski-runners compare, in this respect, with those of other countries I have had no opportunity of judging, but that, when compared with each other, there is this difference between them must be obvious to any impartial observer. If the Englishman's lack of dash arises entirely from poorness of nerve, he is, of course, very heavily handicapped, though not, perhaps, hopelessly so, for patience, determination, and careful training will do wonders in the improvement of bad nerve. I should like, however, to think that there may be some more

flattering explanation of this phenomenon—I have, for instance, heard it said that the fact that most Englishmen are unaccustomed to steep slopes may have something to do with it—but I must confess that, so far, I have not hit upon one that entirely satisfies me.

I have heard two excuses given (by Englishmen) for the low standard of English ski-ing as compared with Swiss. One is that the Englishman gets less practice than the Swiss. This is a mistake. The average English runner perhaps gets only three or four weeks each winter, but the average Swiss gets no more, for he has his work to do, and though he spends his winter in the snow he usually only goes ski-ing on Sundays. The best Swiss runners no doubt are usually guides, or men who spend most of their time in the winter on skis; but this is not always so, and I know more than one first-class Swiss runner who gets little more than one day a week. Among English runners the proportion of those who spend most of their winter on skis is much greater than among the Swiss; yet there are now many really first-rate Swiss runners, but, as I have said, hardly any English ones.

The other excuse is that most English ski-

runners have taken up the sport comparatively late in life.

No doubt they have, and so, for that matter, have many of the continental runners—and a few of the best of them. But to begin late is much less of a handicap than might be imagined, for a man may become a skilful ski-runner without possessing any of the characteristics of extreme youth.

That is to say that, provided he has a fair stock of intelligence, patience, and nerve (and a good teacher), he need have no special aptitude for picking up the knack of unaccustomed movements, nor need he have more than ordinary strength and activity.

The games and sports which are most difficult to learn late in life are those which call for "knack"—in other words, the ability to perform easily a rapid and accurate co-ordinated movement of a number of muscles. If this movement is an unaccustomed one, the ability to perform it properly is only attainable by long practice.

The action of throwing, for instance, requires knack. It is this which makes it so difficult to learn to throw with the left hand, even though one already has the ability to move the left arm with quite sufficient strength and speed, and

not only knows how the movement should be made, but even *how it feels* to make it with the other hand. Writing is another excellent example of knack.

In ski-running nothing which can strictly be called knack comes into play. In this sport the *voluntary* muscular movements (as distinguished from the involuntary ones used in keeping the balance) are neither complicated nor unusual, and, except in jumping, they need seldom be rapid. Any difficulty in learning them is due partly to the disturbing effect on one's clear-headedness of the speed at which one is travelling, and partly to the fact that some of the movements, though simple in themselves, are almost the reverse of those one's natural instinct would prompt one to make in the circumstances. This difficulty, of course, diminishes with practice, but an effort of will goes just as far as, or even farther than practice towards overcoming it. Were it not for this difficulty, a man who had been told the right way to perform the various manœuvres employed in ski-ing might very well do them fairly correctly the first time he tried (as many people actually do), while no amount of strength, activity, intelligence, or confidence would enable him, if right-

handed, to throw or to write properly with his left hand without long practice.

The balancing difficulty is far less serious than is usually supposed. It is the *unexpected* movements of the skis which generally upset the balance; and if one has a clear comprehension of the way in which various combinations of gradient, speed, quality of snow, &c., affect their motion (see p. 74, &c.), one will seldom be taken by surprise. Any one who can stand steadily on one leg, when not on skis, for a quarter of a minute, without waving his other limbs about, has sufficient sense of balance to become a first-rate ski-runner. Intelligence and nerve—the latter including both coolness and dash—are the main factors in good running. It is hard to say which is the more important. Most of one's mistakes in ski-ing can perhaps be traced to want of nerve, but the most perfect nerve will not compensate for lack of intelligence. The intelligent man will soon see that there is very little to be afraid of, that the risk of injury from falling (on snow), even when running fast or alighting after a long jump, is very slight, and that to run with confidence and dash will lessen the danger rather than increase it. When he has thoroughly realised

this, the intelligent man, though his nerve may be none of the best, will probably, if he has any determination, soon beat the absolutely intrepid but stupid one.

Unless, then, we are to believe that a man loses most of his nerve, intelligence and will-power with his first youth, there is nothing to prevent him from learning to ski well when no longer very young.

My own belief is that the best excuse for the low standard of British ski-running is ignorance and bad tuition.

A few English runners have learnt a good system of ski-ing; but these have generally had bad teachers—Swiss guides, very likely, who, though first-rate runners themselves, had more instinct than science, and were quite incapable of imparting clearly to a beginner whatever knowledge they possessed. The majority of English ski-runners have learnt a thoroughly *bad* system, and have very likely learnt at the same time to believe that it is an exceptionally sound one.

The members of both these classes are, as a rule, profoundly ignorant of what an expert can do on skis, of the real advantage of becoming an expert—or, at any rate, as skilful as

possible—and of the best way to set about doing so.

There is no reason whatever why, with practice and good teaching, any man should not become a fairly skilful runner; even if he cannot run with great dash and speed, he can, at least, learn to do so in good style, without—or practically without—any help from his stick.

Very few Englishmen try to do this; indeed, next to caution, the most prominent characteristic of English ski-running is bad style.

Now nearly all the continental runners—certainly all the best of them—have taken the Norwegians as their model, and have, in consequence, aimed not only at running as fast and steadily, but also, in one sense, as easily as possible; that is to say, with the least muscular effort compatible with a perfect control of their skis, or, to put it more simply, *in the best style*.

Most Englishmen, however, have learnt a very different method of ski-ing. This system also teaches the beginner to run as easily as possible, but in quite another sense. The whole aim of the system is to dispense as far as possible with skill rather than with effort. That is to say, it directly encourages bad style.

The system is the invention of an Austrian,

Herr Zdarsky, who, having never seen a ski-runner and knowing nothing about skis or their management, got a pair from Norway, and reasoned out a method of using them, eventually altering them to suit his method.

This was certainly a very surprising achievement, as every one will agree who realises not only the practical difficulty of ski-running, but the complication of its dynamics.

What is less surprising, when one remembers the origin of Zdarsky's system, is that it teaches not one simple method of controlling the skis that had not been discovered long before, and but few of those that had been. It must in fact be regarded, not as a new and different system, but as a small part of an old one—the whole Norwegian system of ski-running.

The distinguishing features of Zdarsky's system are an almost exclusive reliance on the snow-plough position (or an approximation to it), for either braking, turning, or stopping, a deliberate use of the stick to assist these manœuvres and to help the balance on all occasions, an extreme dislike to going fast, and, in general, a pronounced tendency to avoid difficulties of balance rather than to overcome them, and to encourage timidity as well as clumsiness.

The main object of Zdarsky's system is to enable a beginner to run safely on steep and difficult ground with the least possible preliminary practice; and so far, no doubt, it is successful. But its very weakness is what makes it successful, for it turns out ski-runners quickly by allowing them to run badly. It is the very worst school for a beginner who takes up ski-ing no less for its own sake than as a means to an end, for if he begins in this way, sooner or later he will have to alter his methods entirely, and get rid of a lot of bad habits which he would never have acquired if he had, from the outset, learnt his ski-ing in the Norwegian manner.

To become a fairly proficient stick-riding and zigzagging crawler is a very simple matter; but to get beyond this point, and, discarding the help of the stick, to learn an *equally safe* but considerably quicker and more comfortable style of running, is impossible without devoting some time and pains to practising, though far less of both than is usually supposed.

Every one, of course, has a perfect right to choose the style of ski-ing that suits him best. If a man looks upon ski-running simply as a means of locomotion, or if he dislikes the trouble of practising, or has exceptionally poor nerve, or is

extraordinarily clumsy, he will very likely be perfectly satisfied with a slow stick-riding system, and will quite reasonably refuse to try anything else. So far there is no harm done.

Unfortunately, however, many of those who choose this primitive method of ski-ing make the absurd mistake of thinking that their method is a particularly sound and practical one, and delude the innocent novice into thinking the same.

Realising that without the stick they themselves would be helpless, they say that its help is indispensable for safe running. Anything which they cannot do themselves, such as running with the skis together so as to leave a single track; turning or stopping by a free use of the different swings, &c., instead of by their own dreadful imitation of the Stemming turn and Christiania; fast straight-running; jumping, and so on, they condemn as showy, unsafe, and of no practical use, and class under the general heading of "fancy tricks." The absurdity of this standpoint will be patent to any one who knows the immense superiority of good running to bad, as regards ease, sureness, and speed.

Let us compare ski-running with horsemanship. Just as the ski-runner undoubtedly finds it easier at first to run with the aid of the

stick than without, so the man who mounts a horse for the first time will certainly find it a good deal easier to keep in the saddle if he holds on to it by the pommel or cantle. I believe, however, that there is no school of horsemanship which advocates this method of riding as being particularly practical.

The reasons against the use of the stick as an aid to the balance in ski-running are much the same as those against using the saddle for the same purpose in riding. There is a waste of energy in each case, for it is doing clumsily by brute force what can be done more comfortably, gracefully, and effectively by skill. Moreover, the balance, when helped in this way, never improves, but remains permanently bad.

Correct position, narrow track, complete command of the different swings—all those things, in fact, which distinguish good style from bad—mean economy of force, and are therefore eminently practical. To say that jumping is a useless accomplishment may at first sight appear justifiable. In one sense there is not much practical use in jumping, for occasions are not very often met with in the course of a tour where a jump is the only way, or even the safest way, out of a difficulty.

But in another sense jumping is extremely practical. It accustoms a runner to moving at the highest possible speed, and shows him that he need not mind taking a fall at this speed; moreover, to quote from Mr. Richardson's excellent jumping chapter in "*The Ski-Runner*," "the first thing which a jumper has to learn is how to keep calm and collected and to make up his mind instantly what to do next when travelling at top speed—just the very things, in fact, which he must learn if he wants to be a good cross-country runner. For these reasons it is the very best and quickest way of generally improving a man's running."

A very common attitude of Englishmen towards ski-jumping is to treat it as a showy and dangerous acrobatic display, all very well for reckless and athletic youths, but out of the question for any one else. Yet I suppose that among the men who take up this attitude there are many who ride to hounds, and very few who, though they may not themselves hunt, would dream of attributing to men or even women who do so either undue recklessness or unusual acrobatic ability.

Though there may be a doubt as to whether making a jump of moderate length on skis or

riding a horse over a fence is the more difficult feat, there can be none whatever as to which is the more dangerous. Ski-jumping, indeed, is so safe that perhaps it could hardly lay claim to the title of a great sport but for the fact that it is not only difficult, but also exceedingly, if unreasonably, alarming—at all events to the beginner. It seems strange that so many able-bodied English ski-runners never so much as give jumping a trial, unless they have an altogether wrong idea of its danger.

I spoke just now of the ignorance which made many bad runners condemn a better style of ski-ing than their own. It is not easy, at first sight, to see why this ignorance as to the comparative advantages of good and bad running should be so common as it is, for at most of the Swiss winter places there are among the natives some really good performers. The English, however, get few opportunities of watching the Swiss runners, except on the jumping hill, and seldom see them doing their best across country, for these men, unless they happen to be guides, do most of their ski-ing with their own countrymen, the members of their own local ski-club.

Moreover, a good ski-runner is not seen at his

best when acting as a guide, for he has to go slowly, and look after the weaker members of the party, and there is no element of competition to put him on his mettle.

Whatever may be the reason, the fact remains that the average British ski-runner has little or no idea of the superiority of good running to bad as regards safety, comfort, and speed—to say nothing of interest or beauty. He would probably be surprised and somewhat sceptical if told that by learning a good style of ski-ing he would find it possible to do the downhill portion of his tours in about half the time (or less), with half the fatigue, with just as few falls (if he wished to avoid them), and with far less chance of hurting himself when he did fall—for bad style means awkward falls; that he would thus get infinitely more pleasure, interest, and excitement out of his ski-ing, and that, moreover, by going in for jumping he would still further increase all these benefits without increasing his risks.

I hope that by means of this rather rambling discourse I may have managed, not only to show what, in my opinion, are the reasons for the low standard of English ski-ing, but at the same time to implant a conviction of sin

in the conscience of the average English ski-runner.

The object of the rest of this book is to show him what, to my thinking, is the way of salvation, and to place the innocent novice in the path of virtue at the very outset.

EQUIPMENT

THE SKI

The Wood.—Skis are usually made of ash, which is, perhaps, on the whole, a more suitable wood than any other. Hickory is excellent, but is said to be more brittle than ash, and is also heavier. It is, however, but little heavier than the *best* ash, for in the latter wood lightness means bad quality. The wood must be well seasoned, and as free as possible from knots, especially near the bend and the binding, though small knots which do not extend through the whole thickness of the ski cannot do much harm.

The grain of the wood should be wide and well marked. The way it runs in the ski is most important; it should run parallel with the long axis of the ski throughout its length, above all at the front bend and the binding; for if the grain run out at these points, the ski will be very liable to break there. If anywhere else the grain runs out at all, see that it does so in such a way that the lines on the *side* of the ski run back-

wards and downwards (Fig. 1, A), not forwards and downwards (Fig. 1, B).

If the lines of grain on the *sole* of the ski run across at all instead of parallel to the sides, the ski, when it gets rather worn, will not run straight. If, of a pair of skis, one runs to the right and one to the left, it does not much matter,

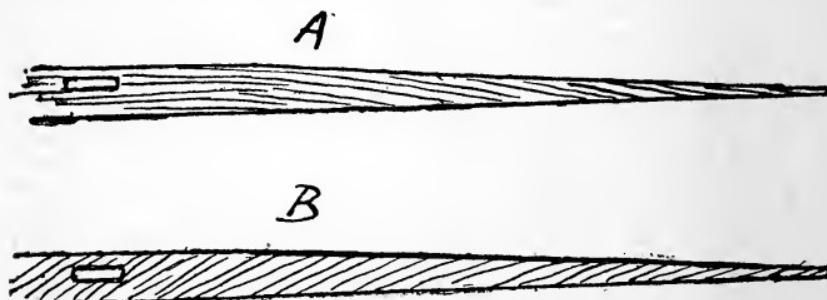


FIG. 1.

Cross-grain ; in A it does not much matter, as it only occurs at some distance from the binding and points backwards ; B is very bad.

for in that case the former can be put on the left foot and the latter on the right ; they will then merely keep together and hold each other straight.

But if both skis run off to the *same* side there is nothing to be done, so look carefully at the grain of the sole when choosing them, to see that there is no chance of this (Fig. 2).

There is one more point to be noticed about the arrangement of the grain in the ski.

If you look at the *heel end* of the ski, you will generally see the grain disposed in vertical lines, as in Fig. 3, B. The ski will not only be stronger

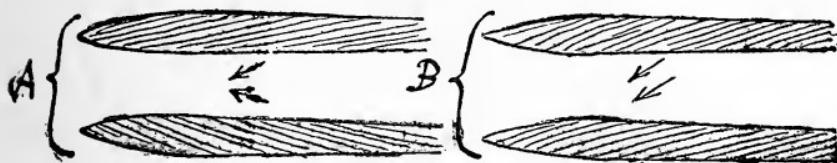


FIG. 2.

Cross-grain on running surface: A converging, not very serious; B parallel, very bad.

and more springy, but will wear better and run faster if cut so that the grain lies horizontally (Fig. 3, c).¹ Fig. 3, A shows a disposition of the

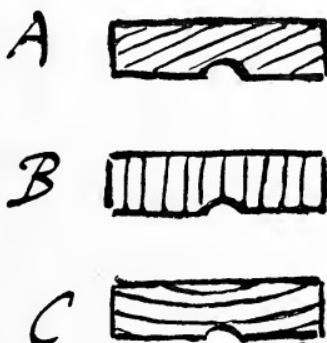


FIG. 3.

A bad, B good, C still better.

grain which is likely to weaken the ski and should be avoided.

The colour of a ski is a matter of taste.

¹ Unless, however, this horizontal grain runs very *straight* throughout the ski, the vertical arrangement is the better.

Dark colours have the disadvantage of causing the snow which collects on the top of the ski to melt more readily ; it may then refreeze and accumulate, forming an unnecessary load of ice.

A dark colour also makes it more difficult to detect faults in the grain, and it is wiser for this reason to buy plain varnished skis, and colour them afterwards if you want them darker.

New skis should be given several coats of boiled linseed oil, each being allowed to sink in before the next is applied. When at last the wood will absorb no more, give it a coat of *raw* linseed oil ; this dries hard, with a surface just rough enough for easy climbing, but slippery enough to make waxing unnecessary, except for the very stickiest snow. The more often skis are oiled, even when in use, the better.

Dimensions.—When you are standing with your arm stretched at full length above your head, the ski, placed upright, should be at least long enough for its tip to reach the roots of your fingers ; it may well reach a few inches beyond the finger-ends.

The longer the ski the pleasanter you will find it for straight-running. On a long ski you keep your balance more easily, run more smoothly on

rough ground, and keep a straight course with less trouble. A short ski is slightly easier for turning, but if you learn correct methods of turning, the difference is insignificant; and in any case, however much you may twist and turn, you are bound for the greater part of the time to be running straight, and you might as well do so as comfortably as possible.

The ski should be as narrow as possible, hardly more than $2\frac{3}{4}$ inches (7 centimetres) at the narrowest part—*i.e.* where the foot rests on it—even for the biggest man.

If it measures $2\frac{3}{4}$ inches in width at the narrowest part, it should be about $3\frac{3}{4}$ inches wide at the front bend, and just over 3 inches at the heel.

A narrow ski is in every way better than a wide one; the only object of increasing the width of a ski is to make its bearing surface on the snow proportionate to the weight of a heavier man, and so to prevent it from sinking more

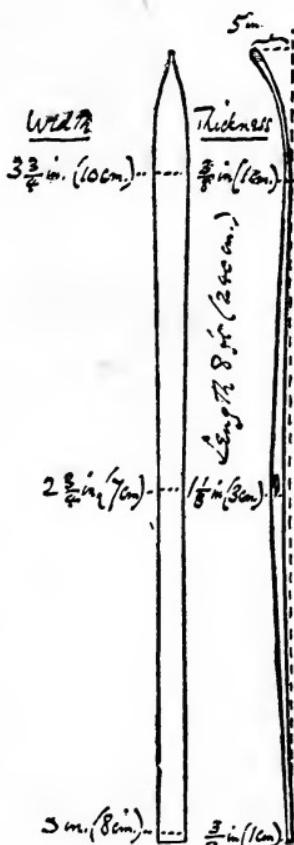


FIG. 4.

deeply and therefore running more slowly. But this should be done by increasing the length rather than the width.

The beginner usually imagines that the wider the ski the more easily he will be able to balance on it. This is a great mistake. A narrow ski is far steadier than a wide one for straight running; it is easier for turning, and infinitely more com-

fortable for moving across a steep slope of hard snow, the diminished leverage putting less strain on the ankles, as the diagram shows.¹

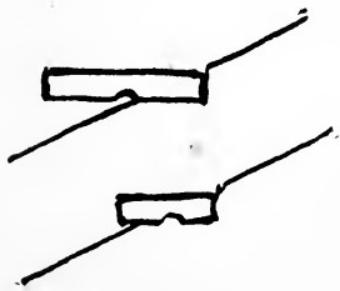


FIG. 5.

The thickness of the ski is proportionate to its elasticity and the weight of the runner, being about $1\frac{1}{4}$ inches at the binding and $\frac{3}{8}$ inch at the front bend and the heel. A stiff ski runs rather less comfortably than a thinner and more flexible one, but it is safer to choose a ski of ample thickness near the binding, especially if it is to be used for jumping.

The turn up at the front of the ski should begin at about one-fifth of the distance from the tip to the heel end. *It should be very gradual,*

¹ If however with a *very narrow* ski a *very wide-soled* boot is worn, traversing a steep, hard slope becomes uncomfortable, as the projecting sole is then apt to catch in the crust and trip the runner.

for a sudden bend makes the ski run more slowly and far less smoothly. The under side of the tip need not be more than five inches above the ground.

There is a slight upward arch between the front bend and the heel. It should be no more than $\frac{3}{4}$ of an inch high at its highest point, below the heel of the boot, only just sufficient to prevent the ski when resting on soft snow from bending downwards in the middle under the weight of the runner. The height of this arch should therefore vary slightly according to the length and stiffness of the ski, and to the runner's weight.

Of course any twist in the ski will prevent it from running true. A simple way of making sure that a ski is free from any such twist is as follows : draw a few lines across its sole, at right angles to a line down the middle of it, and, holding the ski so that a very much fore-shortened view of the sole is obtained, see if all these lines are parallel.

Nothing is more uncomfortable and difficult to run on than a ski which has become warped and has a downward bend in the middle. To prevent this happening and to preserve the upward arch, a pair of skis, when not in use, should be placed sole to sole and bound together at the front bend and the heel, with a block of wood about $1\frac{3}{4}$

inches thick put between them 8 inches or so behind the binding, just where the boot-heel rests on the ski.

Most skis are made with a groove running along the middle of the sole from the front bend to the heel. This groove greatly increases the ski's steadiness in straight-running, and on no account should be omitted. A smooth-soled ski makes turning easier for the runner *who has not learnt the right way to do it*, but this slight advantage by no means compensates for the wobbliness in straight-running which it entails. If you want easy steering, choose extra-flexible skis, but *not* grooveless or extra-short ones.

Most of the ordinary foot-bindings are fixed to the ski by means of a hole bored from side to side through its thickest part. See that this hole is made almost entirely in the upper half of the ski's thickness, well away from the sole. When lifted by a strap passed through this hole, the ski should point downwards at an angle of about 45 degrees.

In order that they shall be stronger in relation to their weight and less flexible, skis are sometimes made with a convex, instead of a flat upper-surface. The increased stiffness makes them less comfortable for ordinary running but safer for

jumping. The convexity should always stop short of the beginning of the front bend.

Fig. 6 shows that it depends on how this convexity is obtained as to whether and how it is an advantage or otherwise. Supposing the wood in each case to be of exactly the same quality, B will obviously be not only stiffer but

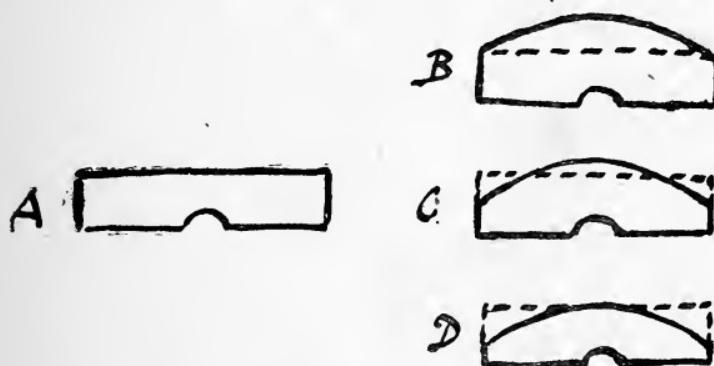


FIG. 6.

heavier than A, C will be stiffer but no heavier, D will be equally stiff but lighter. It is evident, then, that one cannot say off-hand that the convex shape is either better or worse than the flat, but only that, *weight for weight*, the convex shape gives greater stiffness and strength, the flat gives more elasticity.

The Binding.—The question of the binding, by which the ski is fastened to the foot, is a very vexed one; I shall treat it as shortly as I can.

The binding should, if possible, fulfil the following conditions :—

(1) It should be light ; (2) should be easily adjusted to fit the boot ; (3) should admit of being quickly and easily fastened and unfastened ; (4) should be difficult to break and easy to mend ; (5) should allow fairly free vertical movement of the foot, but limit its lateral movement enough to make steering easy ; (6) should be comfortable, and not likely to injure the runner in case of a fall.

There are innumerable forms of binding on the market, not one of which is absolutely satisfactory in every respect ; the choice of a binding is largely a matter of taste. But, though it is not possible to say that any one binding is the best, it is possible to say that certain forms are more generally popular than others. The reader who is not a novice probably knows all there is to be said for and against the more common forms ; while to give a long description of several kinds of bindings, setting forth their various good and bad points, would be more likely to confuse a novice than to help him to choose one that suited him. I shall therefore describe one binding only, the Huitfeldt, which is by far the most generally popular one, especially in Norway, and

shall show how it answers to the above-mentioned requirements.

The Huitfeldt binding (Fig. 7) consists of an iron, leather-lined toe-piece which is passed through the hole in the ski and bent up at each side; a short strap passing over the toes and connecting the ends of the metal toe-piece; and

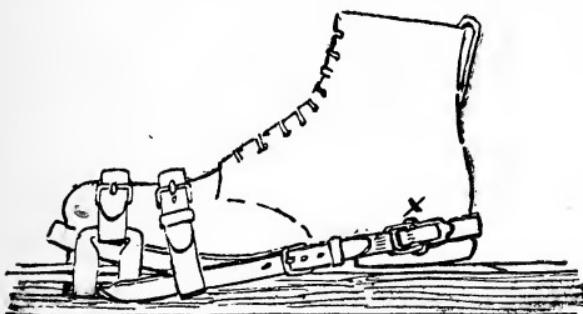


FIG. 7.

Huitfeldt binding, with Ellefsen clamp X (left foot).

a long strap which passes through the hole in the ski and round the heel of the boot.

A third strap, which passes under the waist of the boot, prevents the heel-strap from slipping up the side of the foot, as it is sometimes inclined to do when the heel is much raised; and a fourth strap, crossing the foot behind the toe-strap, prevents the heel-strap from slipping under the boot sole at the side. The heel-strap, however, will often be found to keep in place

perfectly without these two straps, or, at any rate, without the latter, and in that case there is no object in keeping them on the binding.

The ski is fastened on and taken off without buckling or unbuckling the straps when once they have been properly adjusted. In order to put on the ski, simply push the foot well home between the toe-irons, and then pull the heel-strap up over the boot-heel.

The toe-strap may be quite loose; the heel-strap must be so tight that it is only just possible to force it over the boot-heel.

The toe-irons must be hammered or bent (a heavy screw-wrench is useful for this) to fit the sole of the boot exactly, so that when the boot is pushed home between them the centre of the heel lies in the very middle of the ski. This means that for boots of an ordinary shape the inside toe-iron must be more nearly parallel to the side of the ski than the outside one, as in diagram; otherwise the boot-heel will rest on the inner side of the ski (Fig. 8).

If the toe-irons show any tendency to wobble, small wooden wedges may be driven between them and the side of the cavity in the ski, but by the *sides* of the toe-irons, not *below* them, or the ski may split.

The toe-irons should be so adjusted that when the boot is pushed right home the toe only projects a little way beyond the toe-strap (see Fig. 7). If the toe-strap crosses the foot too far back, it does not allow a free enough movement when the heel is raised, and in a fall forward may sprain the foot.

If the fastening fits properly there should be enough freedom to allow the knee just to touch the front of the ski.

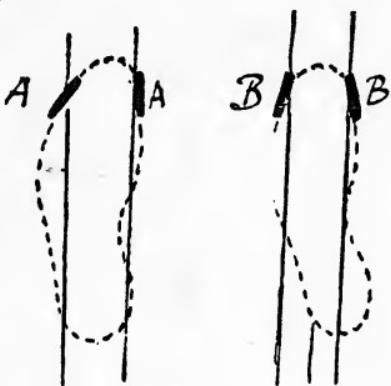


FIG. 8.

A A right, B B wrong positions
for toe-irons (left ski).

In order to prevent the heel-strap from slipping off the boot, the heel of the boot should be made to project at the back, both top and bottom of the projection being rounded to allow of the strap being easily pulled on and off (see Fig. 9, p. 41). This is a better and a simpler arrangement than the strap and buckle at the back of the heel with which ski-boots are often fitted.

The heel-strap should be bent first *downwards* and then *backwards* on each side of the ski, so that the side of it which is uppermost within

the cavity of the ski becomes outermost round the foot. This arrangement increases the tension when the heel rises.

It is most important that the heel-strap should be very tight, for its tension not only limits the vertical movement of the foot, and so makes it possible to lift the heel of the ski, but also, by keeping the boot firmly jammed between the toe-irons, prevents nearly all lateral movement, and so makes steering easy.

The heel-strap consists of two parts; the back part should be fitted with a metal lever called "The Ellefsen Shortening Clamp" (Fig. 7, x). Opening and closing this lever lengthens and shortens the heel-strap; the strap is buckled so that with the lever open it will just pass over the projection on the boot-heel; it can be thoroughly tightened up, when on, by the closing of the lever.

This lever should be so fitted on the heel-strap that it comes on the outside of the heel near the back.

The advantages of the Huitfeldt binding are as follows:—

It is very light. If fitted with the shortening lever it can be put on and taken off in a second or two. It is not easily broken, and is

not difficult to mend. If properly fitted, it limits the movement of the foot enough to give ample steering power. It is quite comfortable, and is most unlikely to injure the foot even in the worst fall.

Its disadvantages are that great care is needed to adjust the toe-irons so as exactly to fit the boot, and keep it in the middle of the ski; and that the heel-strap is rather quickly worn at the points where it rubs against the edges of the toe-irons. This wearing, however, can be diminished by filing down the sharp edges of the toe-iron where they touch the strap, and by occasionally pulling the strap through the hole in the ski far enough to expose another part of it to the friction.

Another slight drawback lies in the fact that the heel-strap, where it projects on each side of the ski, diminishes the speed somewhat by brushing against the snow; but this is hardly worth mentioning.

On the whole, then, the Huitfeldt binding has more good points than bad ones, and is just as likely to suit the beginner permanently as any of the other bindings, if he is obliged to buy his skis at the outset.

If he is able to try two or three different bind-

ings before making his choice, he no doubt will do so; but it is not likely that he will fully understand the pros and cons of any good binding until he has given it a longish trial, and has a fair practical knowledge of ski-running.

In any case, I strongly advise him not to worry too much on the subject of bindings. With all, except the very worst and least widely used bindings, it is possible to learn to ski well, *provided they fit properly.*

He should be careful to see that the middle of the heel rests naturally on the middle of the ski; that the foot has enough vertical freedom to allow the knee just to touch the ski in front, but *not* enough to allow it to touch without considerable tension; and that the lateral movement of the foot is very limited. If these conditions are fulfilled, the binding will be comfortable, safe, and will give ample steering power.

In the Huitfeldt binding and several others of the same type, the steering power and control of the ski is obtained by the tension between the heel-strap and toe-irons. There is another type in which this power is obtained by a false sole, generally made of driving-belting, which is fixed to the ski under the toe of the boot and is free at the heel end. This system gives

greater, or even absolute lateral rigidity, and is therefore more likely to injure the foot.

The most widely used forms of this type of binding are the Ellefsen, a very good binding; the Black Forest or Balata binding, in which the false sole is fitted with a socket for the heel, a great favourite with shopkeepers who hire out skis, because, without adjustment, it will fit anyone somehow—generally badly; and the Lilienfeld binding, an Austrian invention, made almost completely of metal, and giving absolute lateral rigidity, but unsuitable for jumping and disliked by most good runners.¹ Absolute lateral rigidity is not only dangerous, but is quite unnecessary for a runner who has learnt, or who means to learn, correct methods. For in braking or steering, when properly done, the effect is produced by the distribution of the weight, and by vertical pressure on the ski rather than by forcibly twisting or pushing it sideways.

With any binding on the Huitfeldt principle it is necessary to wear a boot with a wide-welted sole which is double throughout its length, in order that it may not buckle at the waist of the foot under the strain of the heel-strap.

The part of the ski on which the foot rests

¹ The Bilgeri binding, a development of the Lilienfeld, is lighter and less rigid.

should be covered by a thin plate of some such metal as brass or tin, which does not oxidise readily. This protects the ski if nailed boots are worn, and prevents snow from accumulating in an uncomfortable lump under the foot. If the boots have no nails, or if the binding has a false sole, a plate of celluloid or linoleum is sufficient.

The Stick.—The ski-runner carries either one or two sticks. He uses them to increase his pace on level ground, or when running down a gentle slope; to help him in walking uphill; to steady him when turning while standing on a slope; and possibly, on very rare occasions, to help to check his pace.

To use them while on the move, either as a help to the balance or for steering, is the mark of a bad runner.

The sticks (for two are more useful than one) should be light; cane or hazel is the usual wood. They should be long enough to reach two or three inches above the elbow, when resting on the snow.

At the top the stick is provided with a leather loop to support the hand while punting. At the other end it is shod with a metal spike, a few inches above which a movable disc, generally made of wicker, is attached to prevent the stick

from sinking into the snow. Choose some disc attachment which does *not* involve the passing of a thong through a hole in the stick, for one of that sort wears out very soon.

CLOTHING

Boots.—In order to avoid frost-bite, to the risk of which the ski-runner is often exposed, the boots must be stout, flexible, waterproof, and exceedingly loose—large enough, in fact, to hold two pairs, at any rate, of the very thickest stockings without the least pressure, especially on the toes. Boots made on the Norwegian “Laupar” principle are particularly good *only* in the respect of giving the toes perfect freedom.

The heel must be very low, and, as explained above, it should be made to project at the back to prevent the heel-strap from slipping off, if the binding has one. For a binding of the Huitfeldt type the sole must be thick, not only at the ball of the foot, but at the waist; it should have a



FIG. 9.

Boot showing rounded projection on heel; sole of uniform thickness from toe to beginning of heel; and metal plates (X) to prevent wear of toe-iron.

widish welt to prevent the toe-irons from pressing against the foot.¹

Where the toe-irons touch the side of the sole, they are apt to wear a hollow, and the boot then works gradually forwards. This can be prevented by screwing thin plates of metal to the side of the sole at this point. To enable the toe-irons to hold the boot as steady as possible, it is better that the sides of the sole should be rather straight (though not parallel) than curved.

The boots should be greased or oiled often enough to keep them quite soft and flexible.

Some form of felt or canvas boot-cover is a great safeguard against frost-bite, which is a danger that can by no means be overrated.

Whether the boots shall be nailed or not is a matter of taste. Nails cut the skis and make the snow ball between them and the boots. Boots with no nails at all make climbing an icy path on foot rather troublesome. If no nails are worn, climbing irons can be carried to strap on to the boot for walking on icy places. Most people wear a few *small* nails, though many (myself included) wear none. A complete rubber sole (which grips on ice but picks up no snow) might work even better than the "Scafe" rubber studs; but I know these are good.

¹ No wider a welt, however, than is absolutely necessary. See note, p. 28.

Stockings.—As I have said, two or three pairs of stockings should be worn. However water-proof the boot, it is impossible to keep the stockings perfectly dry owing to the condensation of water vapour from the foot which takes place on the inner surface of the boot. In severe cold this wet layer freezes, and should therefore be kept as far as possible from the foot. It is useless, however, to fill the boot with stockings to such an extent as to cause pressure on the foot and check the circulation, for this is even more likely to cause frost-bite than is insufficient covering.

Most ski-runners wear a pair of the thickest ordinary stockings, or socks, and over this a pair of goat's-hair socks which are more than twice as thick. These goat's-hair socks (or what are generally sold as such) wear badly, and a pair of socks of the same thickness, but made of wool, seem just as warm.

Spare socks should always be carried on long expeditions in case the pair next the feet should get wet through.

Gloves.—These are an important item. They should be of mitten-shape, with a bag for the fingers, and should have a gauntlet-shaped arm long enough to pull well over the sleeve. Like

the boots, they must be roomy. Felt or wool is the usual material.

A canvas outer covering makes them less liable to get wet through, for the snow sticks to it less. It is always difficult, however, to keep them dry, and a spare pair is often as necessary as spare socks.

Cap.—Some kind of cap which can at least be pulled down over the ears, if not over the neck and chin, is indispensable. As an addition or substitute, an ample scarf or muffler is useful, especially, perhaps, for women.

No hat-brim protects the eyes sufficiently to be the least safeguard against snow-blindness. Dark glasses should always be carried, especially above the tree-line, and should be put on the *instant* that any discomfort is felt from the glare.

Outer Clothing.—This should be as nearly windproof as possible, and should have a smooth surface, for if it be hairy the snow will stick to it, and, when that melts, the clothes will become soaked. For this reason a sweater is not satisfactory as the outermost garment on a long expedition.

Any clothing which cannot be removed during a climb should be fairly light and not too hot, for climbing is often excessively hot work.

A moderately stout whipcord is perhaps as good a material as anything.

In order to keep out the snow the collar of a coat should be made to button close round the neck, and the sleeves round the wrists.

The pockets should have large flaps to button. Most English runners clothe themselves, as to the legs, in breeches and puttees, which are a very efficient means of keeping out the snow. Leather gaiters are useless.

Until recently most Norwegians used to wear rather close-fitting trousers which buttoned tightly round the ankles inside the boots, and a sort of very short puttee round the tops of the boots themselves. For warmth, comfort, and simplicity this system seems hard to beat.

All the foregoing remarks as to boots, stockings, gloves, caps, and material, of course, apply equally to women's clothing.

Whether in addition to snowproof knickerbockers and puttees a woman shall wear a skirt is, of course, a matter of taste or strength of mind. In Germany and Austria most lady ski-runners dispense with it.

If a skirt is worn it is particularly important that both it and the knickerbockers shall be of very smooth texture, otherwise the snow which

works up between them in a fall will not shake out again, but will accumulate in large quantities and soak the clothes in melting.

The shorter the skirt, the better as regards comfort. Even a skirt which only just covers the knees will touch the snow during manœuvres which involve a semi-kneeling position.

As to appearance, I can assure any one who is distressed at the apparent size of her feet and ankles when properly clad that a longish skirt makes them far more conspicuous than a very short one; a skirt long enough to hide them completely is, of course, out of the question. If the thick goat's-hair or woollen oversock goes some way up the leg instead of stopping short just above the boot, and if the puttee is thin and smooth instead of being about half an inch thick and woolly, a less gloomy outlook on life will perhaps be induced.

Underclothing.—Climbing a hill on skis is generally very hot work, but one is often exposed to the most bitter cold on the top, especially when the sun is hidden, or when wind and sunshine come from the same quarter, and it is impossible to take shelter from the former without losing the latter. This makes it very difficult to regulate satisfactorily the thickness

of one's clothing. On the whole, it is perhaps better to wear fairly light underclothing, and to rely for warmth mainly on outer garments which can be carried, instead of worn, during the climb.

If light clothing is worn, two extra sweaters or cardigans may well be carried. In this case they must never be forgotten, but must be carried *always*, no matter what the weather may be, for it may change quickly without the least warning, and, in any case, there is often a bitter wind high up when the heat is almost tropical in the valley.

A windproof coat of thin oil-silk or of a kind of paper-cloth made by a Paris firm, is a very good substitute for a spare sweater. It is warmer, lighter, and takes up hardly any space.

The following things are very useful, some of them indispensable on a long expedition. They can mostly be bought ready made, and I shall not attempt a description where their application is obvious.

Wax, either in a block or a collapsible tube, which is used to prevent wet snow from sticking to the ski. It is smeared on the ski and rubbed in with a rag. It is better, if possible, to do

this before starting out; or, at any rate, to dry the ski first.

A good knife.

Some blunt instrument for scraping ice off the ski without injuring the wood.

A metal ski-tip to fit on the ski, if the point is broken off and lost. A few tools for mending a broken ski—gimlet, screw-driver, and punch (unless the knife is fitted with these); perhaps also a hammer, saw, and file. Small cases of tools with a common handle can be bought.

One or two small steel plates and pieces of sheet brass or zinc with holes bored in them, and

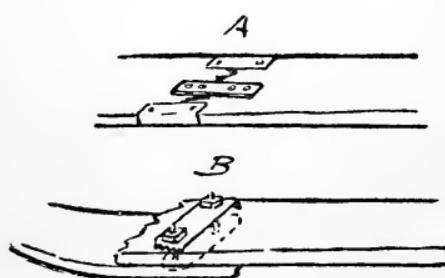


FIG. 10.

Ski mended with (A) metal plates,
(B) clamp.

a few screws to fit them; or a clamp¹ consisting of two metal plates connected by two bolts with wing-nuts.

Fig. 10 shows how these may be used to mend a broken ski.

Spare parts of the binding itself may be carried in case it breaks, and a thong of raw hide about two yards long, with a loop at one end, is often useful.

¹ Sold as "griffe Norvégienne."

This thong, when used as a substitute for the Huitfeldt heel-strap, constitutes what is known as the Lapp binding. This is a most firm and comfortable binding, especially for jumping, but since it cannot be adjusted quickly nor with gloved hands, is unsuitable for occasions which involve frequent taking off and putting on of the skis, or exposure to extreme cold.

Fig. 11 explains the arrangement of the thong.

When arranged as above so that it passes twice round the heel of the boot, the thong is hauled perfectly taut and made fast.

This can be done in slightly different ways; I find the following a satisfactory one. Arrange the thong so that, when it is pulled tight, the points A B are about an inch in front of the heel of the boot, the loop A being on the outside of the foot. Then pass the free end under the waist of the foot, up across the thongs on the inner side, over the instep, and back to A, finishing with a half-hitch round both parts of the thong at A. If this half-hitch is made with the end of the thong pushed through it in

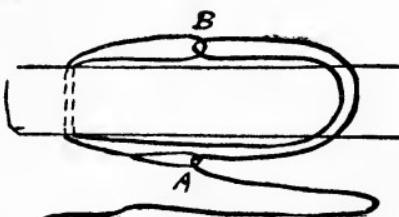


FIG. 11.

a bight, it can be pulled undone like a bow, which is an advantage when the thong is frozen hard.

A few yards of strong cord, some string, and some brass wire are often useful.

A ski may be prevented from slipping backwards in hill-climbing by tying one end of a piece of cord to its tip, passing a few half hitches round it at intervals, hauling all taut, and tying the other end of the cord to the binding. This, however, makes it necessary to lift the ski forward at each step instead of sliding it.

The only satisfactory preventive of back-slip is a strip of sealskin fastened underneath the ski ; this also prevents wet snow from sticking to the ski, as it sometimes does in masses almost too heavy to lift. To prevent back-slip a strip half the length of the ski is sufficient ; for sticky snow, however, it is of course better for the ski to be quite covered. Which of the many forms of detachable sealskin in the market work the best I am not competent to say, having so far managed to do without it. There is no doubt that sealskin is a great labour saver. With its help it is possible to climb so much more quickly than without, that for long mountain tours it is almost indispensable. Moreover, when it is used

for the climb, the soles of the skis can be kept polished or varnished to a degree of slipperiness that prevents even the worst of sticky snow from being much hindrance during the run down.

The rucksack, in which these things, spare clothing, food, &c., are carried, should be very large, snowproof, and strong, but not heavy. Its straps should be wide at the shoulder and long.

About food, or the special equipment necessary for mountaineering, or any other special application of ski-running, I shall not attempt to speak, this book being only concerned with what is absolutely necessary to the ski-runner *quâd* ski-runner.

Those who wish for further information will find it in a vast number of books on mountaineering proper, in Rickmers' "Ski-ing for Beginners and Mountaineers," Richardson's "The Ski-Runner," Arnold Lunn's Alpine Ski Club Guide-books, and in many books in other languages on ski-running and kindred subjects; for instance, "Der Skilauf," by Paulcke (of which a French translation, "Manuel de Ski," is published), and Bilgeri's "Alpine Ski-lauf."

THE MANAGEMENT OF THE SKIS

ON THE LEVEL AND UPHILL

Putting on Skis.—Lay the skis side by side on the snow.

In order to put on the right ski, place the *left* foot on it just behind the binding as in Fig. 12, the toe of the boot being on the left side of the ski and the heel on the right. Your weight then holds the ski steady while you push the right foot well home and fasten the binding. Now lift the right foot and ski, stand them on the left ski in a similar way, and fasten that to the foot.

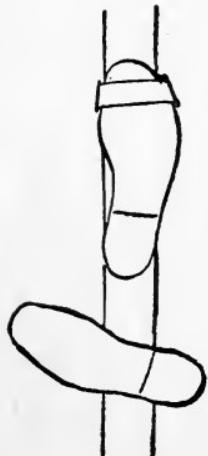


FIG. 12.

On a hill-side lay the skis *across* the slope; stand *below* them, and put on the *lower* ski first, bringing the foot to it across the front of the other leg.

On the Level.—The ski-runner moves on the level with an action much like that of ordinary

walking, except that he does not lift his skis from the snow, but slides them along it.

Hold your skis *exactly parallel* and as close together as possible—not more than two inches apart—and take a long, easy, lunging step, keeping the knee of the advancing leg well over the foot, and leaning the body well forwards (Plate I.).

Move the stick, or sticks, in time with the opposite leg, giving a push at each, or at every alternate stride, according as you carry two sticks or one.

Slide as far as you can after the advanced foot has received the weight, and don't be in a hurry to bring forward the other one.

The body must be swayed slightly from side to side with each step in order to balance it well over the ski which carries the weight.

If you wish to get up the greatest possible speed on the level with two sticks, take three running—not sliding—steps, swinging the sticks forwards with the first two, and, at the third, giving a push with both sticks, followed by a long slide.

Then do the same again, starting with the other foot.

Uphill.—If the gradient is very slight, you can slide straight uphill in just the same way as on the level.

At a rather steeper gradient (the angle depending on the slipperiness of the snow and the skis) you will still be able to move in the same way, but without the extra forward slide after the weight has come on to the advanced ski.

If the slope becomes still steeper you will find that the friction is hardly enough to make the skis hold. The moment you feel they have a tendency to slip backwards as the weight comes on them, walk as upright as possible, even leaning slightly backwards, so as to bring the weight on the heels and throw a little tension on the toe-strap. Shorten your stride, and, instead of sliding the skis along the snow, lift their points six inches or so into the air as you move them forwards (but do not let their heel ends leave the snow), and bring them down again in front of you with a gentle but decided stamp.

In making this stamping movement, take care, as you bring the foot to the ground, to stamp it in a direction exactly at right angles to the surface of the slope. The least suspicion of pawing backwards, or lunging forwards, as the ski touches the snow is sure to make it slip.

By moving steadily and carefully in this way it is possible to walk up an appreciably steeper gradient than the one at which the skis first



On the level.—(I.)



Stopping a back-slip.—(II.)

3
16

show a tendency to slip back. But it is no use attempting to struggle or hurry; no amount of effort will help you, and if you cannot do it easily you cannot do it at all.

If the gradient becomes any steeper than this—and except in the worst conditions of sticky snow, the slope will still be quite gentle, the skis will slip backwards in spite of all your care. At the first sudden and unexpected back-slip instinct will prompt you to throw yourself forward, strike out with the back foot, and make a sort of pawing movement with the advanced one. If you do this, your skis will slip from under you and you will fall on your nose. Do nothing of the sort, therefore, but the moment the ski slips lean *right backwards*, with a free swing of the body, at the same time lifting the slipping ski quickly round behind the heel of, and to right angles with, the other ski, to stop you (Plate II. p. 54). To proceed as before being now impossible, you have the choice of three different methods: zigzagging, herring-boning, and side-stepping.

Zigzagging.—Turn more or less sideways to the hill and then move forwards at a gradient just easy enough to prevent back-slipping. The skis are held as close together as possible, and

moved just as before; but now, instead of being "flat" to the surface of the snow, they are "edged" (cutting more deeply into it with the edges which are nearest the hill) and one ski is more or less above the other, according to the steepness of the slope.

If the surface is very hard and icy, and the skis cut in very little, less than half their width may rest on the snow. In order to lessen the muscular effort then needed to hold the ankles vertical (see p. 28) press both *knees*, especially the lower one, well over towards the hill.

Hold the sticks in each hand, and use them just as before, no matter how steep the slope. If the slope be very steep, the stick on the uphill side can be held shorter, but the two sticks should never (except on a dangerous slope) be put together and held across the body with both hands, as a climber holds his ice-axe. To do so will only get you into a bad habit of leaning towards the hill and supporting yourself with the stick, and will prevent you from balancing yourself properly and walking freely.

If only one stick be used, it should be carried in the hand which is nearest the hill.

If a steep slope is so hard and slippery that nothing will make the edges of the skis grip, hold the point of each stick close against the *downhill* side of *each* foot, move the sticks exactly in unison with the feet, and dig their points hard into the crust at each step. This gives a perfectly firm support for the skis and answers the purpose of climbing-irons. It is, however, very seldom necessary.

Having found the steepest gradient which you can negotiate without back-slipping, so adjust your course across the hill that this gradient remains constant. That is to say, if you come to a spot which is steeper—*no matter how slightly, or for how short a distance*—don't dream of trying to move on to it without altering your course; but instantly turn more sideways to the hill, so that although the *direction* of your course is altered its *gradient* remains the same as before. By this means only will you avoid falling on your nose, or, at any rate, struggling and slipping uselessly.

Nothing is more common than to see a beginner making frantic efforts to cross a short bit of steeper ground without altering his course. He could attempt nothing more hopeless.

It is amazing how many exhausting struggles

and falls are usually needed to impress on a learner the fact that it is utterly impossible for him to advance *even one single step* on steeper ground—however slight the difference in gradient may be—without altering his course.

Of course if the slope becomes *less steep*, you

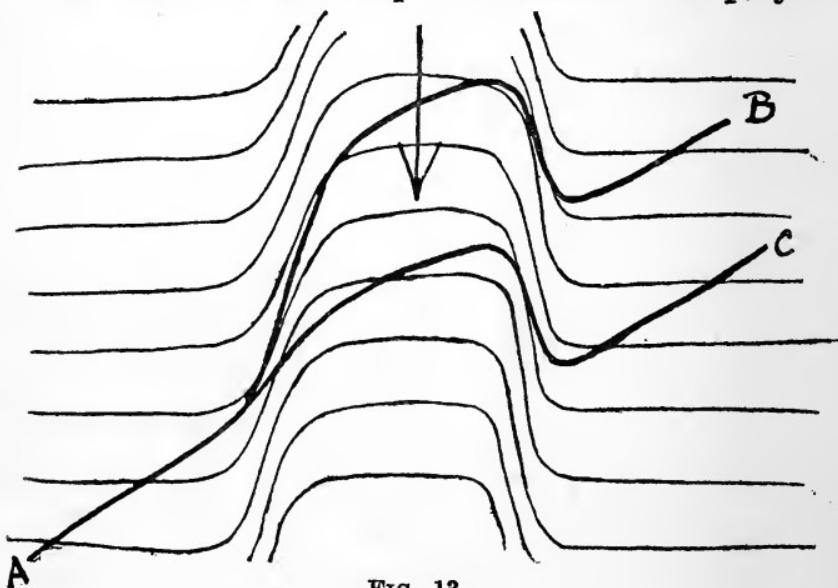


FIG. 13.

turn less sideways to the hill and mount it more directly.

The diagram will, perhaps, help to explain the proper way of moving uphill across ground of varying gradient.

It represents a slope with a steep-sided gully running down it. The conformation of the ground is indicated by contour lines, as in a map—*i.e.* imaginary horizontal lines running

along the side of the hill, with the same *vertical* distance between each pair. Where, then, the contour lines in the plan are far apart the slope is gradual, and *vice versa*.

Since the direction of the fall of the slope is everywhere at right angles with that of the contour lines, its *general* direction only is shown by the arrow ; at either side of the gully its *local* direction is, of course, nearly at right angles to this.

AB is the track of an experienced ski-runner. Observe that (i) in general shape the line AB resembles the contour lines ; (ii) it never cuts the same contour twice ; (iii) when the contours are far apart it cuts them at a blunter angle than when they are close together. In other words, the expert (i) makes a détour at the gully ; (ii) never loses any height that he has once gained ; (iii) moves steadily uphill at a constant gradient, facing the hill *more* directly where it is *less* steep, and *vice versa*.

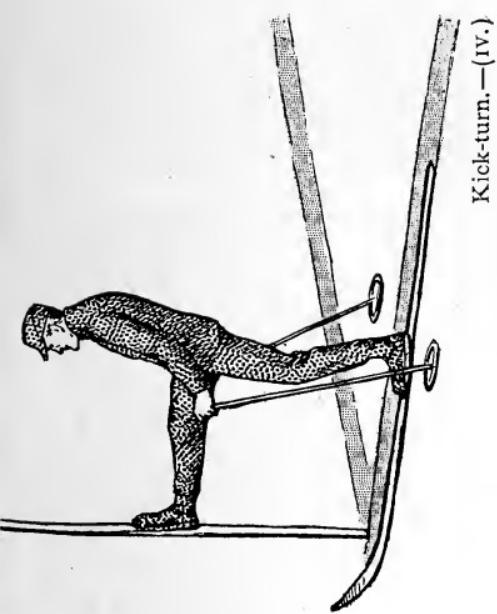
AC is the track of a beginner. Trying to cut across directly towards B he runs downhill into the gully, but, being of course unable to climb straight up the steep slope on the far side in the direction of B, he has to bear away to the right ; and at C, when his track from A is quite as long as the expert's at B, he is not nearly so far up the hill.

Remember that the variation of contour needs just as careful attention in its smallest details as in its main features, and must be negotiated in exactly the same way. In climbing in this way it is, of course, impossible to go on continually keeping the same side to the slope (unless the hill is perfectly conical in shape and quite free from obstacles, allowing one to wind round it to the top in a spiral). Having moved in one direction for a time, you will eventually have to turn round and begin a fresh tack.

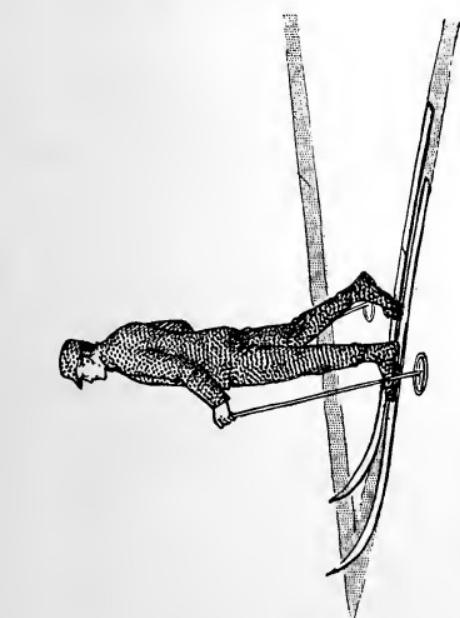
To shuffle round, as you might do on the level, is obviously impossible; for, whether you do so facing up or downhill, the skis will at a certain angle begin to run away.

The usual procedure is to make what is known as a kick-turn.

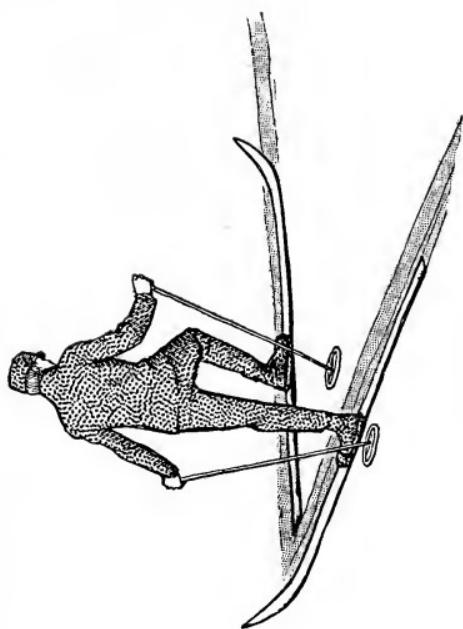
The Kick-Turn.—Suppose that you have been traversing the slope with the hill on your right side and wish to make a fresh tack. Stop with your skis pointing uphill at the angle at which they have just been moving, and your sticks resting close to each foot. Then put your weight on the lower ski, and draw back the other, slightly bending the upper knee and raising the heel (Plate III.). Now swing your right leg from the hip vigorously forwards and upwards, straightening



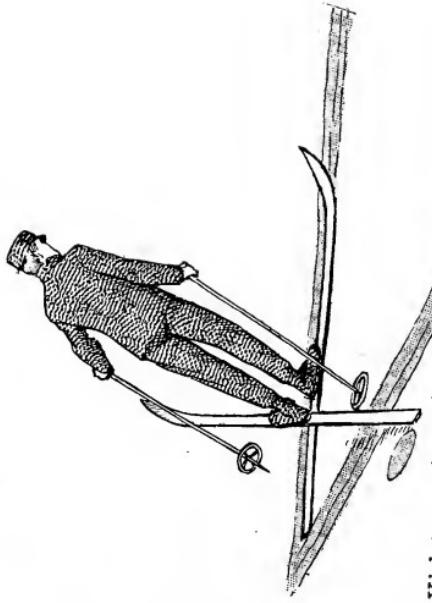
Kick-turn.—(iv.)



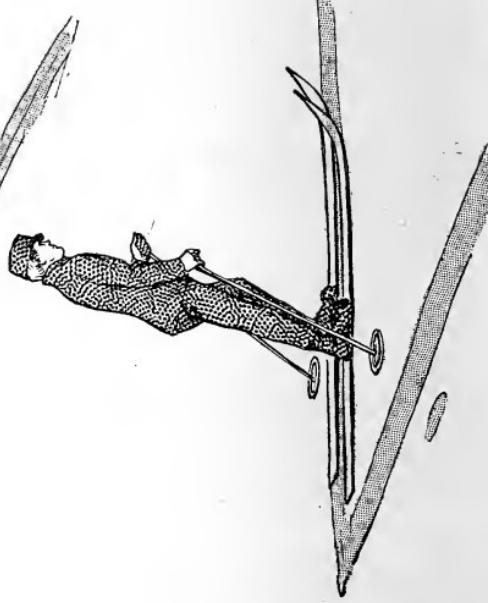
Before kick-turn.—(iii.)



Kick-turn—(v.)



Kick-turn.—(VII.-a)



Kick-turn : finished.—(VIII.)



Kick-turn.—(VI.)



Kick-turn : wrong position.—(VII.-d)

it completely as it rises, and turning up the toe as hard as you can, as though trying to make a very high kick. The leg *must be swung freely*, not merely lifted. The result of this movement, if made with confidence, will be to bring the ski to an upright position with its heel resting in the snow close to the bend of the other (Plate IV.). If there is any hesitation, the knee is sure to remain bent, and the toe to point forward, the result of which will be that the heel of the ski will catch in the snow before it has moved far enough to the front.

The position in Plate IV. is only momentary. As soon as the ski is standing on end in the snow swing its point round to the right and downwards, until the whole ski again rests on the snow, pointing uphill in the *opposite direction*, but at the same angle as before (Plate V.). During this movement the heel of the right ski remains in the snow where it was placed at first, and acts as a pivot. The steeper and more slippery the slope, and the less directly you have therefore been climbing it, the narrower, obviously, will have to be the angle between the skis in the position of Plate V., but, if your joints are normally supple, it is only on very steep or icy slopes, when the skis have to be brought

nearly parallel, that you will find it much of a strain to turn your feet and knees far enough outwards.

Next shift the whole weight over on to the upper leg, at the same time straightening it and letting the other hang slightly bent; this movement will lift the lower ski and stick just off the snow (Plate VI.). Then *straightening the left knee and turning up the toe as hard as possible* (Plate VII., A), face towards the point of the right ski and bring the left ski round to the side of it (Plate VIII.). This time, however, make no attempt to kick or swing the leg, as you did in turning the right ski, but *keep the left foot quite close to the right as it moves round it*. The only difficulty here is to keep the point of the ski from catching in the slope above you as it turns. On a very steep slope, in order to avoid this, you will have to change from the position of Plate VI. to that of Plate VIII. very quickly, straightening the left knee and turning up the toe *with a sudden jerk* as you do so, and also *lifting the left hip* as much as you can. This will for a moment throw up the *point* of the left ski much higher than if the movement were made slowly. But if you try to lift the *whole ski* high above the snow with knee bent and toe

dropped, or to swing the left leg away from the other, the point is nearly certain to catch (Plate VII., B).

The left stick is moved round with the left ski, but the point of the other stays in the same place throughout the turn; when only one stick is carried it should, therefore, be held in the hand which, before the turn, is the uphill one. The sticks of course help to steady you, but you should be able to turn without any stick in your hand, and should learn to do so as soon as you can.

Having reached the position of Plate VIII., you can, of course, begin a fresh tack, at the end of which you can make another kick-turn by reversing the words right and left in these directions.

The kick-turn, as I have described it, is made with three distinct pauses at the positions of Plates IV., V., and VI. Instead, however, of starting the turn by standing the upper ski on end and using its heel as a pivot, it is quite possible to do so by just lifting it far enough for its heel to clear the front of the standing leg, turning it in the air, and bringing it directly to its final position on the snow in one continuous movement. By then lifting the lower ski the instant the other comes to rest, and turning it without

any preliminary pause, you can make the whole kick-turn so quickly that you hardly come to a standstill between one tack and the next. On a steep slope, however, it is always safer to begin by standing the upper ski on end before turning it, as otherwise its point is apt to catch in the snow before it has reached the proper new position.

There is another very convenient modification of the kick-turn which can be performed without coming to a standstill at all.

As you come to the end of a tack with, say, your left side to the hill, take a long step forward with your right foot, placing the right ski in front of the other one, pointing it uphill as much as you can and edging it inwards (Fig. 14, 1). Then, throwing the weight momentarily *against* the right ski rather than *on* it (for if you actually stand on it it will slip backwards), take a wide step round to the left with the left ski, putting it down so that it points as nearly as possible in the direction of the new tack you are about to start, with its heel quite close to the heel of the other ski (Fig. 14, 2). As the left ski comes to the snow, bring the right ski round beside it (Fig. 14, 3) and walk on in the new direction. The whole process must be carried out quickly and accurately, for if there is any

hesitation about the first two steps you are almost sure to slip backwards and fall on your nose. It is, however, really very easy, except on the steepest slopes, and is a great saving of time. The position in the middle of the turn is much the same as in "Herring-boning," described later

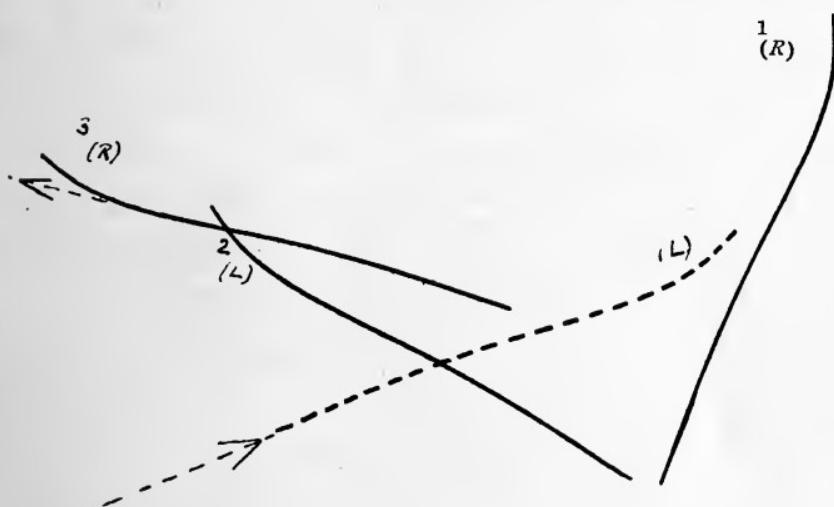


FIG. 14.

(see Plate IX.). The sticks must be held up out of the way of the skis.

Another way of making the kick-turn is to go backwards through the whole process first described. After finishing a tack to the right, for instance, you can move successively through the positions of Plates VII., A, VI., and V., and then lift the upper ski round to the position of Plate III. By turning in this way, however,

you lose a little height instead of gaining it; this method is, therefore, rather more suitable for *descending* a hill in zigzags than for climbing it.

All the above ways of turning are known as *uphill* turns because one faces the hill during the process; it is also possible to make the kick-turn facing *downhill* by turning the *lower* ski

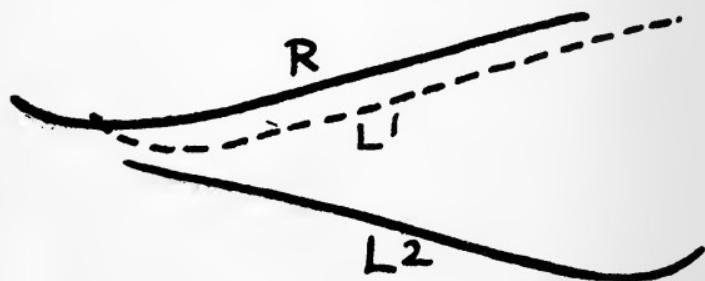


FIG. 15.
Downhill kick-turn.

first. In order to prevent strain in the intermediate position, this downhill turn should be both started and finished with the skis pointing *downwards* as much as possible (Fig. 15); this makes it particularly convenient for joining two downhill tacks. It can also, of course, be made backwards as well as forwards, with a slight consequent gain instead of a loss of height. In a downhill kick-turn the skis have more room to move freely, but the balance is much less steady

than if one faces the hill. On the whole, the forward uphill turn first described is far the most useful, but when you want to turn in cramped corners, among trees and the like, you will find it a great help to know several ways of doing it.

Although, as I have said, the skis need never be quite parallel at the middle stage of the turn, you must take great care to bring the first ski far enough round to prevent the least chance of its slipping. On a steep or icy slope, where the skis at this stage must be brought nearly parallel, the kick-turn becomes difficult for the stiff-jointed; I have even known two cases in which it was apparently impossible. If, as is highly unlikely, your case is similar, you can always roll round on your back with your skis in the air—a simple but snowy process.

If you dislike this, and if, though the *joints* of your legs are stiff, the *muscles* are strong and active (a not unusual combination), you can as a last resource *jump* round, facing downhill as you turn. The main difficulty in this is to prevent the heels of the skis from catching in the slope when half-way round, and the best way to prevent them doing so is to jump as hard as possible not directly upwards, but *out* from the hill,

so as to land *below* where you take off. In order to bring round the skis close beside each other, press the *knees* together throughout the jump. Hold the sticks near their middles, and jump from the toes, not the flat of the foot, with a free swinging action, not a hurried jerky one. This

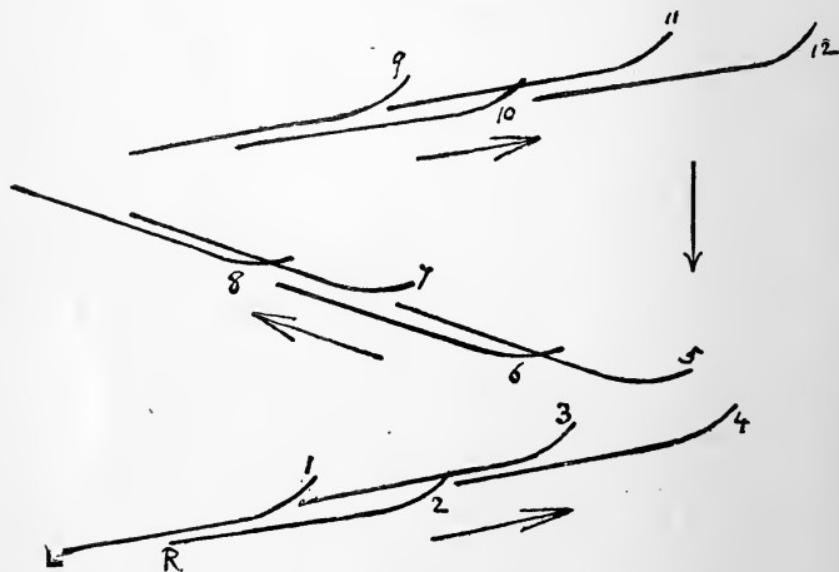


FIG. 16.

Zigzagging without turning.

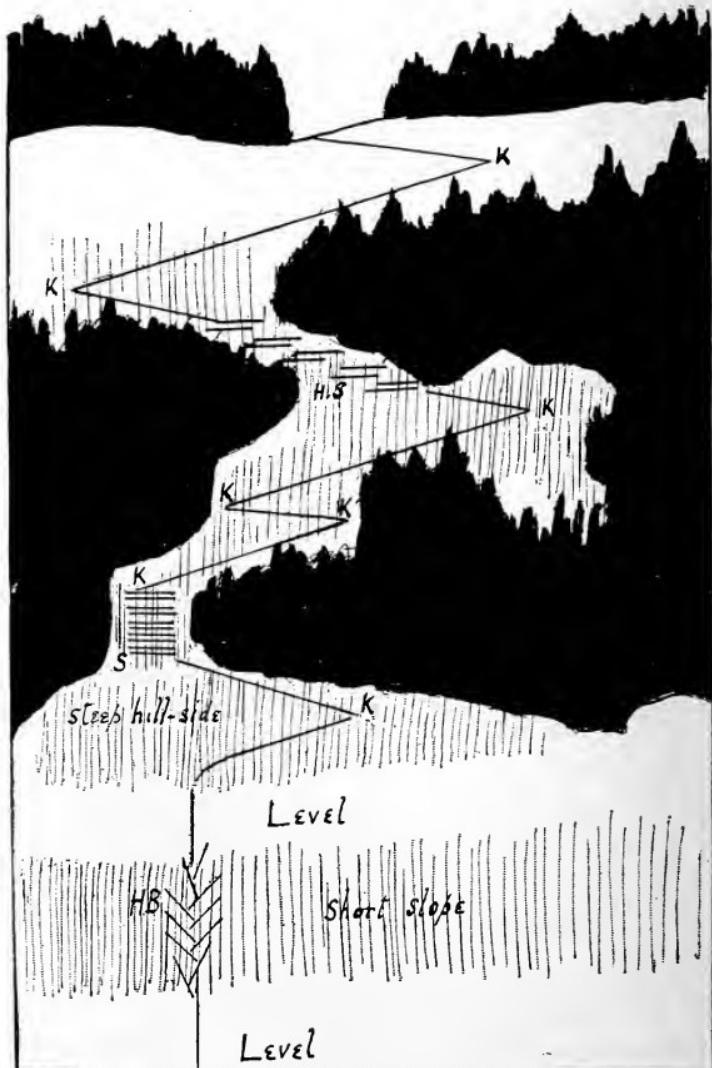
jump needs little skill and is easy enough on a moderate slope, but on a steep one becomes very hard work, for there the skis have less room to turn, and a powerful spring is necessary. The jump round, therefore, being most difficult under the same conditions as the kick-turn, and much more tiring, is hardly a satisfactory substitute



Herring-boning.—(ix.)



Side-stepping.—(x.)



H.B., Herring-boning; K., Kick-turn; S., Side-stepping;
H.S., Half-side-stepping.—(xa.)

(Uphill track showing application of various methods of hill-climbing.)

for it; I only mention it as a perfectly possible one.

The accompanying diagram, which is practically the same as one in Mr. Richardson's book, "The Ski-Runner," shows how, by walking alternately backwards and forwards, one can climb a steep passage, just wide enough to allow zigzagging, without wasting time in turning at the end of each tack. A description is unnecessary. It is, of course, possible to make the tacks of any length, but the number of steps in each must always be an even one, as the tack must be started with the upper foot and finished with the lower.

Half Side-stepping.—In tacking uphill among obstacles you may want to traverse at an angle so steep that the skis would back-slip if you tried to move straight forward in the ordinary way. You will then have to step sideways as well as forwards with each ski, the upper one starting the process and the lower one being drawn up to it, and then advanced. Fig. 17, A, shows the track that will be left.

This must of course be done without pointing the skis uphill more steeply than the angle at which they could traverse in the ordinary way. In lifting the upper ski sideways you are sure at

HOW TO SKI

first to point it uphill too much (Fig. 17, B 3), when, if it does not slip back at once, you will tread on it with the heel of the lower ski at the next step (Fig. 17, B 4). To avoid this, do your best at first to place the upper ski *horizontally* across the slope, lifting its *heel* well upwards and away from the other, pointing the foot down-

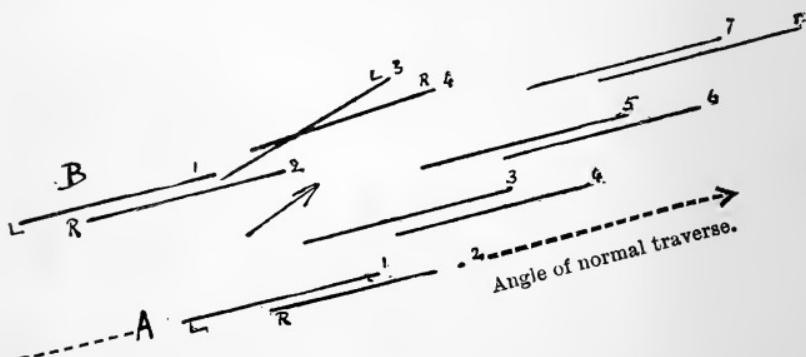


FIG. 17.

Half side-stepping ; A right, B wrong.

wards and inwards, and turning your body so as to face a little downhill.

On open ground, if the snow is so slippery that the gradient of an ordinary straightforward traverse has to be very slight indeed, this half side-stepping can be used simply to save time. Especial care must then be taken to place the upper ski nearly horizontally. Half side-stepping can be kept up for a long time without difficulty ; but it is more tiring than ordinary straightfor-

ward traversing, and I think it is a waste of energy to employ it constantly when there is no special reason for it, as some runners are fond of doing.

Side-stepping.—It is, of course, also possible to side-step directly uphill with the skis quite horizontal, as in Fig. 18, but this, though very easy, is such a tiresome process that it is seldom used except in narrow passages where there is room for nothing else, or for climbing short slopes that are very steep and icy.

Herring-boning (Plate IX.).—This is the quickest but far the most tiring way of going straight up a steep slope. Stand with skis together pointing as much uphill as they can without slipping. Lift the upper ski, and, keeping the feet close together, turn it until it points across the hill in the opposite direction, but *at the same angle as before*, with its heel across that of the other. Then slide it forwards until it just clears the lower one; stand up on it and draw up the lower foot so that the skis are again crossed at the back at the same angle as before, but with the hitherto lower ski uppermost. You can now

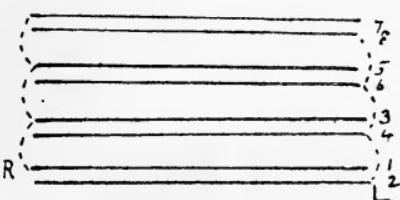


FIG. 18.
Side-stepping.

take a new step in the other direction, and so on.¹ Fig. 19 shows the track. The steeper the slope the wider must be the angle between the skis to prevent them from slipping back, but you can



FIG. 19.
Herring-boning.

always, if you find it difficult to turn the feet enough outwards, point the skis uphill more steeply than would otherwise be possible, by simply throwing the weight momentarily *against* rather than *on to* each ski (see p. 65), and keeping the feet well apart the whole time instead of bringing them together between each step. But though this is a quicker method, it is a still more tiring one than the first.

If the slope is steep, herring-boning is too exhausting to be kept up for more than a short time by anyone but a trained athlete, but on a gradient which will allow the skis to diverge at only a slight angle it is easy enough.

Getting up from a Fall.—If during any of

¹ For the above method of herring-boning I am indebted, through Mr. Rickmers, to Herr Zdarsky.

these manœuvres you should fall down, you may find some difficulty in getting up again.

The first problem is to disentangle the skis, if they have become jammed in a complicated position.

The best way to do this is generally to begin by moving your body as far away from them as possible. If, for instance, you have fallen with your head downhill, wriggle yourself still farther downhill. Next lift your skis into the air, either by rolling on your back and raising the legs from the hips, or by rolling on to your face and bending the legs backwards from the knees. It is generally possible to free the skis in this way, but occasionally one cannot move without unfastening them first.

Having freed them, place them parallel in the air, and roll round on your side so as to bring them to the snow on the downhill side of you and exactly at right angles to the fall of the slope.

This is important, for, if they are pointing either up or down hill, they will, of course, begin to slip the moment you put your weight on them.

If they are quite level, and your feet are exactly below your body, you have merely to

push yourself up with the arm which is underneath you and stand erect. If you want to help yourself up with your stick, do not poke it vertically into the snow and try to climb up it, for if the snow is deep and soft you will only plunge it farther in without getting any resistance. Lay it horizontally on the snow, and it will then give you enough purchase to push up from.

On level ground it is harder to get up again than on a hill side, owing to the difficulty of getting the skis underneath one in order to get to one's feet. After freeing them and placing them parallel, lie on your side, draw your knees as close to your chest, and your feet as close to your thighs as you can, lay your stick flat under your side, and, with a vigorous push on it, you ought to be able to get your weight over the skis and stand up.

Never hurry, or try to struggle frantically to your feet without any definite method. You will merely exhaust yourself. It is impossible, as a rule, to get up without going through the various manœuvres that I have described, but these take a very short time if they are performed smartly and accurately.

GENERAL PRINCIPLES OF STEERING, ETC.

This chapter is mildly theoretical, and may be skipped by the reader who believes in nothing that is not, in the ordinary sense of the word, practical; for in it he will find no definite instructions, but only a description of the behaviour, under different conditions, of the skis when in motion, and an attempt at an explanation of it.

I advise him, however, to try to read it, for I think that what I have to say here is, in a broad sense, strictly practical. I am convinced at any rate, that if, when I began ski-ing, some one had given me the information which I am about to try to impart, and which, for the most part, I have slowly collected for myself, I could have reached in a month the very moderate degree of skill which it has taken me five seasons or so to arrive at.

If the reader can thoroughly grasp the few facts with which this chapter is concerned—and he can take my word for the facts, whatever he may think about my comments on them—he will, I think, find it far easier to understand,

remember, and put into practice the instructions which he will find in the subsequent chapters, as to the various swings, turns, and other manœuvres for controlling and steering the skis, and keeping the balance while running downhill.

Before proceeding any further, I had better, in order to avoid any chance of being misunderstood, explain certain terms of which I shall constantly make use throughout the rest of the book. These terms are the "edging" and "flattening" of the skis, and the "inside" and "outside" of a curve.

If any reader feels than an explanation of these terms is an insult to his intelligence, I can only assure him that such an explanation has been necessary in the case of many of my pupils.

The terms "edging" and "flattening" simply have reference to the relation of the plane of the ski's sole with that of the general surface on which it is resting, and do not refer to its relation with a horizontal plane, or, in other words, to its position in space

Thus a ski is "flat" when standing in the normal position on level ground; but, when standing in the normal position on the side of

a slope, it is *not* "flat," but "edged," for in this case the edge nearest the hill cuts deeper into the snow than the other although the plane of the sole is still horizontal. (Fig. 20, A and B.)

The case is altered when the ski is in-

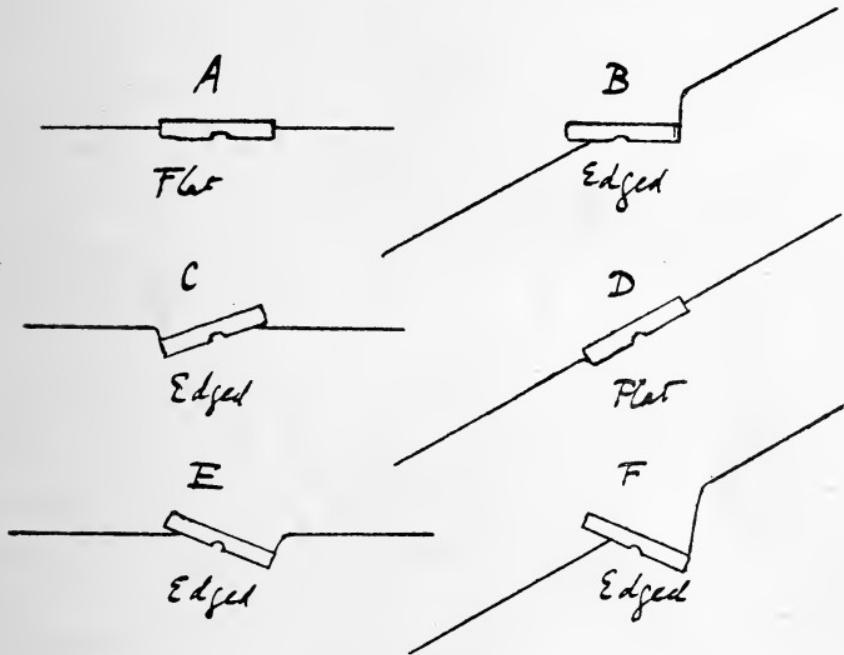


FIG. 20.
Edging and flattening.

clined sideways; on level ground a ski that is inclined sideways is "edged" (c and E); but on the side of a hill a ski when inclined sideways so that the plane of its sole becomes parallel with that of the surface of the slope, is *not* "edged" but "flat" (D). When inclined to the opposite

side, however, it is, of course, "edged" even more strongly than in the normal position (F).

The inside and outside of a curve mean, respectively, the sides nearest to, and farthest from, the centre of the circle of which that curve is an arc; that is to say, that in speaking of a swing or a turn to the right, the right ski, foot, and so forth are the inside, and the left the outside ones, while in the case of a turn to the left it is just the reverse.

This is simple enough. A shade of ambiguity, however, may lie in the fact that the edges of a ski are generally called "inside" and "outside" with reference to their relation to the foot, in the same way as those of a skate. In speaking, then, of swings or turns, the right edge, say, of the right ski may be referred to as its "outside" edge, even when the right ski itself, and the right leg, shoulder, and so on are all the inner ones in relation to the curve of the swing.

Now for the facts referred to above.

When a ski is pointed directly downhill and is made to slide with its sole held flat on the snow, it runs, if properly constructed, in a perfectly straight line.

If it is then "edged" to one side it runs round gradually to that side, the curved point

acting against the snow like a bow rudder and drawing it to that side.

The steering effect, in theory, increases with the edging until it reaches its maximum when the ski is edged to a right angle. What happens in practice is that though the edging and the steering effect do increase together, there is no use in edging the ski beyond a certain angle—less than 45° —as, if that angle is exceeded, the ski sinks deeply into the snow and refuses to slide.

If that angle is not exceeded, however, the deeper the ski sinks into the snow (owing to the softness of the latter) the greater is the steering effect, for then a larger and more sharply curved surface of the point comes into action as a rudder.

If when going straight downhill the runner “edges” his ski—we will suppose he has only one—*by simply leaning sideways*, he will equally simply fall down; but if he “edges” it *without leaning*—if he edges it *in relation to himself*, so to speak—it will begin to turn; that he then leans sideways in order to keep his balance does not make the turn sharper.

If the runner traverses the slope with his ski held normally, as in Fig. 20, B, it will run straight, for although it is then edged in relation

to the slope it is not edged in relation to him. If he edges it in relation to himself it will turn more or less according as the gradient of its previous traverse has been steep or gradual.

When a ski running straight downhill is made to turn by "edging," the further it turns, and the less directly therefore it points downhill, the less abrupt becomes the curve of its course. This curve, indeed, eventually becomes so gradual that before the ski has turned far enough to point horizontally across the slope and come to a standstill, the line of its track is practically straight.

When, therefore, a ski, traversing directly at a moderate gradient, is simply "edged" towards the slope, there is no perceptible turning effect, even if the runner does not lean inwards.

At first sight it might appear that the movement of a ski when edged and travelling in a curve would be precisely similar to that of a skate, and so it is in a way.

Since the edge of a skate is, in shape, the arc of a circle, a skate, when edged, cuts cleanly round without side-slip, and so in a sense does a ski, when simply edged, for its heel then follows in the track of its point. An edged ski, moreover, like a skate, turns more or less gradually, according to the angle at which it is edged. But while a

skate, the edge of which is curved throughout, touches the ice with only a very small part of this edge, and is able to make a curve of very small radius, a ski touches the snow with nearly the whole length of its edge, the greater part of which is quite straight. This straight part so far neutralises the turning action of the curved point, that a ski made to turn simply by edging is unable to make anything but a very long and gradual curve—so gradual, indeed, that for practical purposes of steering the edging of the ski, *unaided*, is absolutely useless.

But though, contrary to what one might expect, the edging or flattening of the skis may practically be disregarded as *primary* factors in a turn, they are, as we shall see, of the greatest importance as *secondary* ones.

Before a ski can be made to turn at all sharply, its heel must be got out of the track of its point

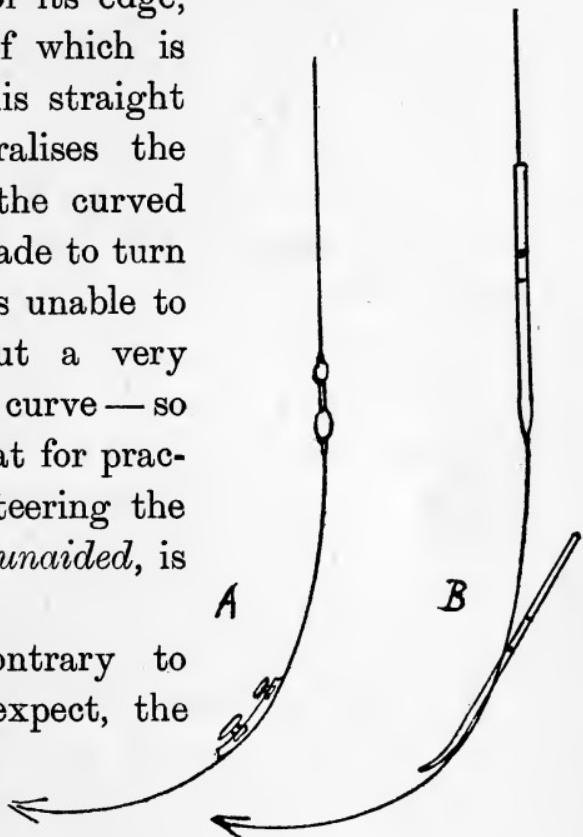


FIG. 21.

and made to travel faster on a curve of its own (as in Fig. 21, B). The ski as a whole, in fact, must be made to side-slip more or less as well as move forward.

The first question, then, is how the ski-heel is to be got out of the track of the point in order that the side-slip may start. If the ski is pointing nearly directly downhill, whether flat and running straight, or moving edged in a long curve, there is—apart from the help of the other ski, which we will leave out of the question for the present—only one possible way of doing it. The runner, by means of sudden—though not necessarily more than a very slight—muscular effort must jerk it more or less broadside on. How he makes this effort need not be considered here ; we will also defer the consideration of the other ways in which the side-slip may be started. Supposing it has been started, it must then, by edging or flattening, be encouraged to continue, if the ski is to go on turning.

It depends on the quality of the snow as to whether a ski side-slips more freely when flat or when more or less edged. If the surface of the snow is hard and icy, or if there is a mere shallow layer of loose snow on a hard crust, a ski will slip sideways either when quite flat

or when slightly or even strongly edged on the side *from* which it is moving.

The flat position would in this case be the more favourable if the hard surface were perfectly smooth ; this, however, it seldom is ; it usually has small projections which, when the ski is quite flat, strike its side and check or stop it, while, if the edge is raised, they strike its sole obliquely and affect its motion but little.

The flat position, then, is not advisable as an aid to side-slip even in the case of hard snow ; on snow of any other kind it is still less advisable, for if the ski sinks deeply into loose soft snow, or even but a little way into dense soft snow or into a thin crust, it can hardly be induced to side-slip at all when held quite flat, while when more or less edged, it can usually (if already in motion) be made to do so without much difficulty.

The reason is not quite obvious, for at first glance it would appear that the ski would meet more resistance from the snow in the edged position than in the flat, but this is not the case, for, when the ski is edged, most of the resistance is exerted *obliquely* against its sole, and so tends to make the ski rise to the surface of the snow and relieves the pressure. When,

however, the ski is flat, the resistance acts *directly* against the side of it, and there is no lifting tendency to diminish the rapidity with which this resistance increases as the snow is compressed.

Moreover, since during a turn the runner must lean inwards to keep his balance, the ski cannot remain in its normal position in relation to the

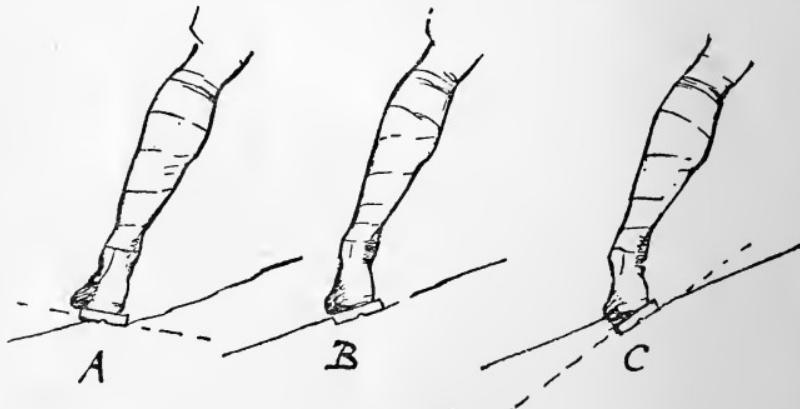


FIG. 22.

leg unless it is more or less edged inwards (Fig. 22, A). That the leg and ski should remain as nearly as possible in their normal relative positions is an advantage, for the more nearly they do so the less is the strain on the ankle. If the weighted ski is held quite flat during a turn in which it is outermost, that ankle is placed in a very unstable position (Fig. 22, B), and is liable to give way and so edge the ski

on that side *towards* which it is moving (Fig. 22, c); it will then cut more deeply into the snow and be brought instantly to a standstill.

In all that I have said so far about side-slip, I have assumed that the ski is moving more or less broadside on, with its heel travelling out-

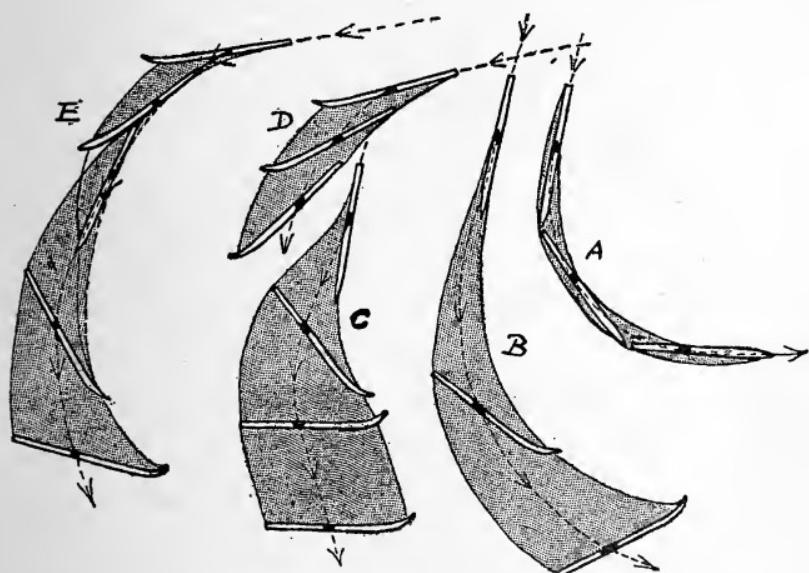


FIG. 23.

side the track of its tip and its pivoting point well forward, and this is what either one or both skis actually do during the greater part of any swing or turn; for, in turning, a ski usually passes through the positions of either b or c, Fig. 23. A ski may also, as, for instance, in turning downwards from a slow traverse, move

so that the curve in which its point travels is outside that of the heel (Fig. 23, D) and its pivoting point is near the heel. In each of these cases, though one end is side-slipping faster than the other, both ends are slipping to the *same side*, and the ski, as I have said, has therefore to be edged to the *opposite side*.

If, however, the ski begins to turn as in D, and finishes as in B or C, it must of course be edged first to one side and then to the other, as in E, and for a moment be flat. At this moment the pivoting point of the ski is at its centre, and its heel is side-slipping in one direction as much as its point is in the other, as in A. If ever, therefore, a ski, in turning, *continues* to pivot on its centre (Fig. 23, A) instead of only doing so for a moment, it must obviously be held quite flat, as otherwise either one end or the other will cut below the surface of the snow and be checked suddenly.

Now the pivoting point of a ski is never behind its centre except during a downward turn, and the faster the runner is moving before the turn, and the sharper the turn is made, the more quickly this point moves to the front; the only case, I believe, in which

it remains near the centre for an appreciable time, and when, therefore, the ski has to be held deliberately flat, being that of the outer ski during a "steered" Christiania swing.

In order to facilitate side-slip, therefore, the outer edge of the ski must usually be raised as it turns or, even if at first the inner edge must be raised, a change of edge must usually take place almost immediately. The flat position, in fact, must never be sustained—except, as I have said, during a Christiania "steered" swing, and even then only for a short time—it is simply a necessary incident in a change of edge.

In each figure in Diagram 23 the dotted line with arrows shows the *average* direction of the ski's course at each point, and whether, therefore, it must be edged or flat.

The foregoing remarks are an explanation of how the edging or flattening of the ski can be made to help the side-slip; the next thing is to understand how the side-slip can be made to help the ski to turn sharply.

If, when either standing still on the side of a slope or running across it in the normal, edged position, a ski is partially flattened, it will begin to slip sideways—in the first case moving directly

downhill, and in the second obliquely, *i.e.* forwards as well as sideways.

Now the foot stands on the ski at about half-way between the front bend and the heel—that is to say, about the middle of that part of the blade which rests on the snow; and as long as the runner's weight is placed equally on toe and heel, a ski in side-slipping will continue to point in a direction parallel to that in which it was pointing when the side-slip began.

When, however, the runner's weight is placed on the heel, that end of the ski will side-slip faster than the other, and the farther the ski slips the more it will point uphill; while when the weight is placed on the toe the reverse will happen.

Fig. 24 shows what will happen if a ski, when (A, B, C) at rest on, or (D, E, F) running across a slope, is made to side-slip with the runner's weight variously distributed. In this and succeeding diagrams the blackened portions of the skis are those on which the runner's weight is put.

In A the ski slips broadside on downhill.

In B it gradually revolves as it slips, and would finish by running downhill backwards if its shape did not prevent it from doing so.

In **C** its rotation is reversed, and it finally runs straight downhill.

In **D** it runs slightly sideways, but the direction of its course is a straight line.

In **E** it turns uphill and at a certain point stops.

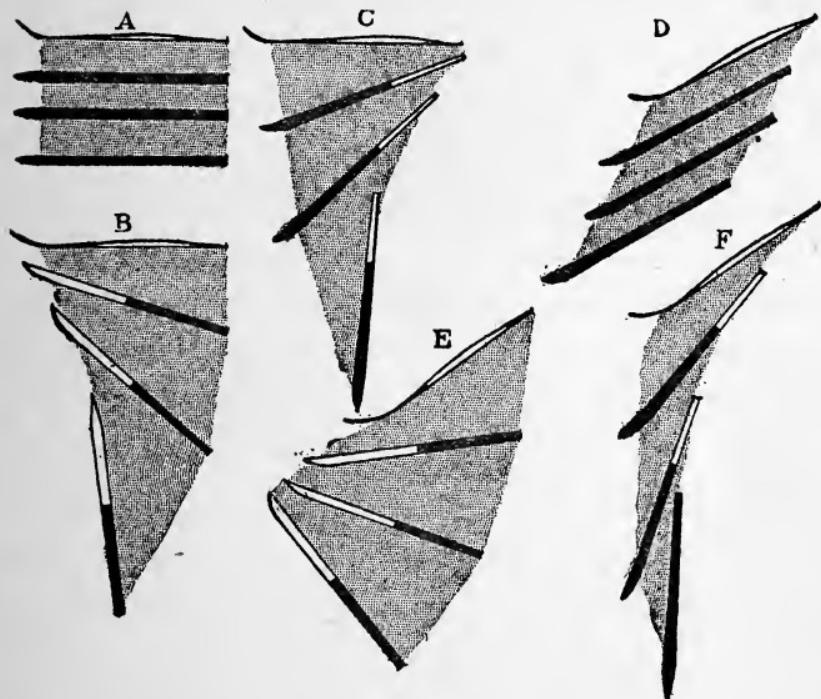


FIG. 24.

In **F** it at first turns and finally runs straight downhill.

The side-slip can be stopped more or less quickly at any stage by the runner strongly edging the ski and at the same time again equalising the distribution of his weight on it.

Whether the ski then runs on in the direction in which it is pointing, or comes to a standstill, of course depends on whether it is pointing downhill or not.

It is obvious, then, that when a ski is in motion *across* a slope the runner, by means of the side-slip, can make it turn in either direction and to any extent up to a certain limit, and can in this way either come to a standstill, slightly alter his direction, or run straight downhill. It is equally obvious that no matter what means are employed for starting a turn (there are more ways of doing so than I have yet described), the distribution of the runner's weight on the ski or skis which carry it may make all the difference to the success or failure of the manœuvre.

I have already said that when a ski is running straight downhill it may be made to turn by the runner jerking it somewhat broadside on. He can of course do the same with the two skis, but a simpler plan is for him to stand on one, point the other more or less in the direction in which he wants to go, and hold it so for a moment. It is thus of course made to "stem"—in other words, to side-slip—and, if the runner then throws his weight on to its heel, it can,

as we have just seen, be made to turn still further, the previously weighted one being again brought parallel with it as it does so. A turn can also be started from a traverse in the same way.

When one ski is held at an angle with the other in order to start a turn in the above way, the relative position of the two usually produces some steering effect; the two skis in fact act together something like a boat and rudder. To say that one ski may be looked upon as the boat and the other as the rudder is hardly accurate, for the steering effect is at its greatest when, as the runner's weight is shifted from the ski that is running straight ahead to the one that is held sideways, it rests equally on both; at which moment, since their area is equal, either of the skis may equally well be looked upon as the rudder or as the boat. If, however, it is remembered that the boat steers the rudder no less than the rudder steers the boat, and that if the rudder is fixed in a certain position, it and the boat together may be considered as one solid object whose shape determines whether and how it is able to turn, one may, by comparing the skis with a boat and rudder, understand whether and how, when held in various relative positions, *they* are able to turn.

HOW TO SKI

The diagram shows the skis as they are held at the beginning of—A, a Telemark, B, a Stemming turn, and c, a Christiania. It also shows a boat turning to the left steered by both a bow and a stern rudder.

The steering action of the skis may be best

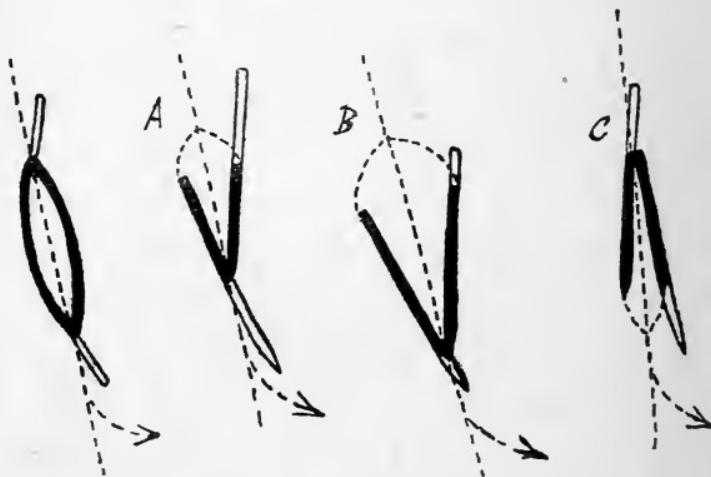


FIG. 25.¹

understood by considering the blackened parts of each pair (in which the steering effect is neutral) as the sides of a boat, and the light point and heel of each pair as a bow and stern rudder respectively. It will then be seen that the boat is in each case helped to turn to the left by the action of both rudders, or that if it can in some way be made to turn to the

¹ The darkened ski of each pair is the weighted one.

left without the help of the rudders, they will at least not hinder it—than which, as a matter of fact, little more can be said in the case of the Telemark; though in the Stemming turn there is a strong steering action while the skis remain in this position, and a distinct, if weak, one in the Christiania.

The principal factors, then, in the control and steering of the skis are the edging or flattening of them, the distribution of the weight on them, and the placing of them in certain positions in relation to each other. How these various factors interact during the different swings, turns, &c., will be explained more fully in subsequent chapters, but before closing this one I want to give some explanation of how a turn on skis depends as to its character on whether the ski at the moment of beginning the turn is running straight down the hill or across it, on whether the speed is high or low, and the slope steep or gentle, and also on the quality of the snow.

The accompanying diagram shows the successive positions assumed by a ski (the leading one, the other is not shown) during a turn to the right, under various conditions.

The line passing through the middle of the

skis shows the curve on which the runner himself travels during the turn; the line ending in a double arrow shows the sort of curve on which he would travel if the ski were able to cut round without side-slip as a skate does. It will be seen that if there were no side-slip he would in every case move steadily to the right of the line of his original course (shown by a dotted line in the diagram), but that, on account of the side-slip, the line on which he travels sometimes moves only slightly to the right of that line, even when the turn itself is a sharp one, that sometimes it moves to the left of it and then recrosses it, and that sometimes it remains entirely on the left of it throughout the turn. To understand how, according to the conditions, the curve of the runner's actual course varies, is a great help to the balance, for at first one's instinct is to balance the body as if the ski were cutting round like a skate, *i.e.* to lean inwards too much, which, of course, inevitably results in a fall.

In every case the turn is supposed to be made as sharply as the conditions allow. It will be seen that on hard snow the runner, when travelling fast, will skid almost directly sideways for

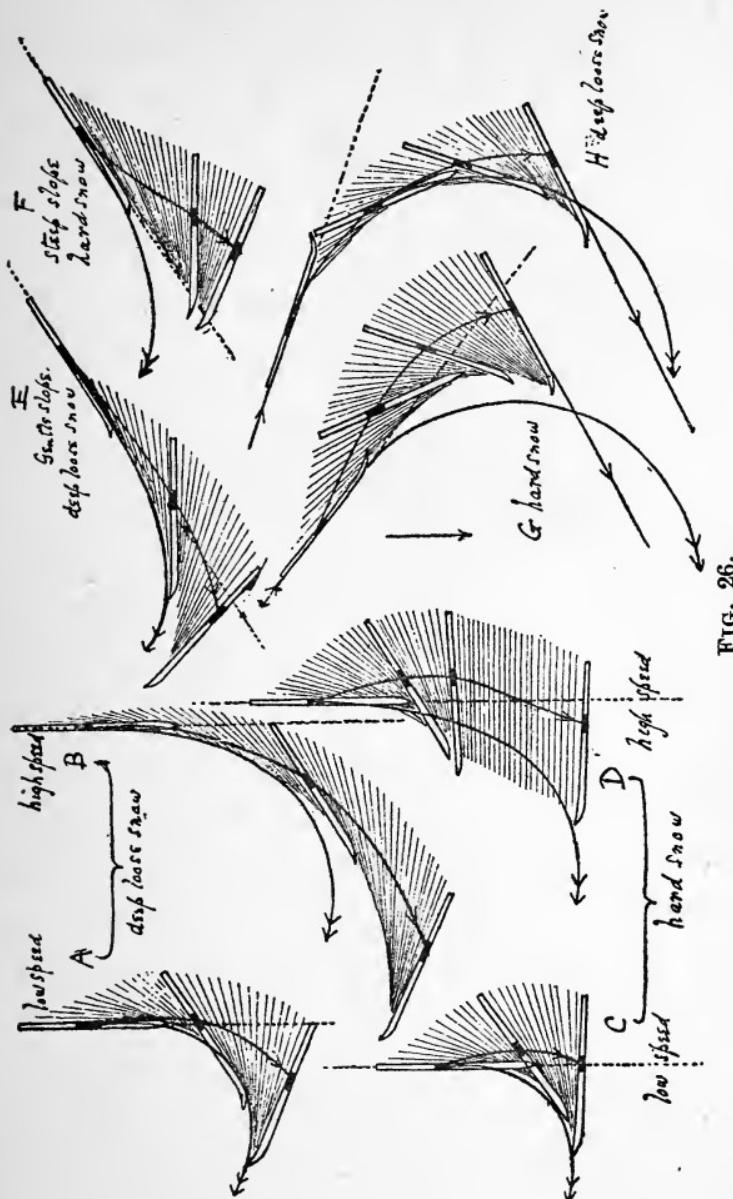


FIG. 26.

some distance from the spot where he actually finishes turning.

A, B, C, D are turns made while the runner

is travelling straight downhill, or, which amounts to the same thing, while he is running on the level at the end of a downhill slide. E, F, G, H are turns made while the runner is descending a slope *obliquely*. A to F are what are known as uphill turns, which bring the runner to a standstill; G and H are downhill ones, which enable him to join one tack to another when descending a hill in zigzags.

If anyone who has done no ski-ing at all reads this chapter, he will, no doubt, think it very complicated; but if, while actually learning to ski, and especially while learning the turns, he looks through it from time to time, I think he will soon understand whatever is not quite clear, and will, I hope, find that it helps him to correct his mistakes and to understand and remember his instructions.



Scraping right ski.—(xi.)



Scraping left ski.—(xii.)

STRAIGHT-RUNNING

Cleaning Skis.—Before attempting to start, you must make sure that your skis will slide.

In thawy weather, or very strong sunshine, the snow may stick to their under surfaces—so badly, sometimes, that sliding is out of the question. But it is seldom quite impossible to slide, and under conditions which seem hopeless to a beginner one can generally get started, if one knows how to set about it. When once under weigh the great thing is to keep moving, for the moment the skis stop sliding the snow will stick again, and the whole cleaning process described below must be repeated.

In snow which is only slightly sticky you need merely stamp your skis hard once or twice, and rub them firmly backwards and forwards on the hardened snow until you can feel that they are quite slippery. Then slide off at once.

If the snow sticks badly, the skis must be scraped on each other (unless there are any branches or hard objects lying about which will

do as well). To do this on level ground is easy; on the side of a hill rather less so.

Suppose you are obliged to start your run on the hillside and wish to scrape your skis.

First stand with your skis pointing across the slope, and, by vigorously stamping or jumping, make as hard a place to stand in as possible.

If you are standing with your right side to the hill, and want to scrape the right ski, rest your left ski on its right (inside) edge, lift round the right ski, and put it across the other one, at right angles to it, just *behind* the left foot and pointing directly uphill. Then scrape it hard up and down across the raised outer edge of the left ski, bending the left knee well and crouching down so as to get a long scrape from the heel *right up to the bend* of the right ski (Plate XI.). When the ski feels perfectly smooth, lift it round again parallel to the other ski, and *without resting it on the snow for an instant* stamp and rub it backwards and forwards until it is as slippery as possible and the snow beneath it as hard and smooth as you can make it. Then, and not until then, you can rest the ski on the snow, placing it on its right (outer) edge and doing your best to prevent its sole from touching the snow. Now, with your weight on the right ski, but still

holding it well on its edge, face downhill, lift round the left ski, put it across the heel of the other one, pointing downhill, and, crouching well down as before, scrape it clean on the inside edge of the other (Plate XII.); this time it is the *heel* of the ski which it is difficult to get at. Then bring it round to the side of the right ski, repeat the stamping and rubbing process, and place it carefully on its inside edge. Now start instantly. (How to do so is explained later.)

If the snow is very bad indeed, it is best, when on tour, before beginning the descent, to take off the skis, scrape and wipe them absolutely clean, and dry them thoroughly in the sun or air—but not, if you can help it, by standing them upright in the snow, for if they are wet the water will run down and form ice at the heel ends. Then wax and polish them well, let their soles cool in the shade if they are warm from the sun, and put them on. You will probably be able to slide off without trouble; or, if it is still necessary to scrape and rub them, they will become clean more easily.

This scraping sounds an elaborate and wearisome process, and so it is. Fortunately it is not often necessary; but, when the snow is really



bad, it is an enormous saving of time and trouble in the end to attend minutely to every detail, and may be the only means of getting a run at all.

It is not unusual to see a beginner refuse to get his skis thoroughly clean, under the impression that the slower pace will make things easier for him. He could not make a greater mistake. If he leaves any snow sticking to his skis they will certainly move slowly (unless they refuse to slide altogether), but they will do so with an irregular, jerky motion which is ten times more upsetting than the fastest movement of polished skis.

Starting.—To start from the top of a hill is a simple matter. You walk to the edge and slide over in any direction you choose.

On the side of a slope, however, there is a difficulty in starting a run straight downhill owing to the fact that, as you move the skis round, they begin to slide before you are facing the way you wish to go.

One way to overcome this difficulty is as follows: Suppose you are standing at right angles to the fall of the slope, with the hill on your right, and wish to start to run straight downhill.



Starting a run on hillside.—(xiii.)



Straight-running: normal position.—(xv.)



Straight-running: normal position.—(xiv.)



Straight-running; how *not* to do it.—(xvi.)



Straight-running: Telemark position.—(xvii.)

First move both skis round a little way, so that, like the left ski in Plate XIII., they point downhill as directly as possible without actually slipping. Then, putting all the weight on the left ski, lift the right ski and place it on the snow, pointing straight downhill, its tip being just in front of and below the tip of the other one, as in the photograph. The weight should still be on the left ski. If there is any sign of slipping, you can stop it by turning the skis on to their inside edges and pressing outwards against them with the legs.

You are now quite steady and ready to start. In order to do so you merely have to throw *all* your weight on to the *right* foot and to lean well forward, downhill. The right ski will at once slide off, the right foot will strike and push forward the point of the left ski, which will, if left to itself, come round, and fall into what, as will appear later, is its proper position close to the side of the other.

Another simple and frequently used method of starting downhill from the horizontal position is to jump round. The same points are to be noticed as when using a jump in the place of a kick-turn. Bring the feet level, spring from the ball of the foot, press the *knees* as well as the feet

together, hold the skis parallel, and don't let their heels drop. You must land leaning well forward, so that the general direction of the body and legs is at right angles to the slope, *not* vertical, otherwise the skis will run from under you.

This jump round is easier than the first one described, being only a quarter-turn, while the other is a half-turn.

Straight-running.—As you begin to slide, place yourself in the position of Plates XIV. and XV., which is the normal one for running downhill—skis held in contact, so that they leave a single track; one ski about a foot in advance of the other; the advanced leg almost straight at the knee, the other more bent; nearly all the weight on the back foot; the inside of the front knee pressed against the *kneecap* of the other; body erect; arms hanging easily by the sides; stick, or sticks, if carried, held clear of the snow.

Hold yourself perfectly easily and without stiffness, especially at the knees, which should give to the inequalities of the ground. It is far better to stand too loosely, and sway about somewhat, than to keep every muscle tense.

You can keep the skis together without effort by bending the knees and ankles well inwards,

so as to place the skis slightly on their inside edges; they will then tend to run together rather than to separate. Take the greatest care to avoid any approach to a bow-legged position, which would edge the skis outwards. There should be no daylight visible between your knees to a person standing in front of you.

If you should find the skis running wide apart with the weight equally on both, don't try to force them together, but throw all your weight on to one ski, and then you will be able to move back the other quite easily to its proper position.

Carry the stick, or sticks, as shown in the photographs (Plates XIV. and XV.). On no account hold a single stick (or the two sticks placed together) in both hands. If you feel the smallest tendency to do so, practise at first with nothing in your hands.

This will save you from acquiring the habit of falling into the deplorable attitude shown in Plate XVI., or the almost equally bad one in which the stick is held out in front transversely like a balancing pole, ready for the teeth of its owner if he happens to pitch forwards.

If their weight or length makes it difficult to keep the sticks clear of the snow when held by

the ends, hold them rather nearer the middle, but not *much* nearer or they will be more likely to hurt you if you fall.

Don't hold out the arms horizontally from the shoulders, for that is tiring and ungraceful.

The knees, as I said, should give to small inequalities of the ground; but as you are almost sure instinctively to stiffen them a little when you find yourself approaching a bump or hollow which looks likely to upset your balance, it is as well to bend or straighten them *voluntarily* according to circumstances. As you go over a mound, for instance, bend the knees and let the body sink; if it is necessary to sink low, raise the heel of the back foot and let more weight fall on the advanced one. As you cross a hollow, straighten the knees and rise as high as you can. In this way the pressure of the skis on the snow will vary but little and the unevenness of the ground will scarcely be felt. The feeling will be that of moving steadily and smoothly along, lifting the skis over the hillocks, and pressing them down into the hollows. A spectator who can only see your head and body should hardly know that the ground over which you are moving is not perfectly smooth.

In this way you can negotiate short variations of gradient where the general angle of the slope remains constant. In the case of larger inequalities, or where the general angle of the slope changes, you must alter your procedure. The line from your centre of gravity to its point of support must always be at right angles to the surface of the slope, so, where the ground becomes steeper, you will have to lean more forward, and less so where it becomes less steep. But though you will have to tilt yourself forward consciously as you pass on to a steeper slope, you may safely leave to unconscious instinct the backward lean in the opposite case. If you try to lean backward consciously, you are almost certain to overdo it and to sit down.

There is a further safeguard in the case of sudden changes of gradient, very rough ground, snow of varying consistency which alternately checks and accelerates the speed, and, in fact, anything which makes it difficult to keep the balance—that is, to drop into what is generally known as the “Telemark” position (Plates XVII., XVIII., XIX.), because it is the one held during the swing of that name.

To assume this attitude, you shift the weight

from the back foot to the advanced one, and then sink down, leaning the body forwards, bending both knees, and sliding the back ski still farther back until its bend is level with the leading ankle.

Practically all your weight should then be upon the leading foot, and upon its heel, no less than its toes. To make sure of this, the advanced leg must be bent at the knee almost to a right angle, and the knee must be kept well forward, so that the leg, from the knee downwards, will be at right angles to the ski, no matter how steep may be the slope.

If the front foot is thrust forward in advance of the knee, too much weight will fall on the toe (unlikely as it may appear) and, moreover, some weight will be thrown on the back foot, which should carry next to none. Let the back knee drop until quite close to the ski (when crossing uneven ground it will very likely touch it) and raise the heel of the back foot as far as possible. That leg should then be perfectly relaxed and easy. Keep the skis close together as before, so that they leave a single track, by edging them a trifle inwards and pressing both *knees*, especially the back one, well inwards so that, seen from in front or behind, they overlap.

Practise running in this position with either foot leading, taking care to keep the weight well on the front foot. It is an indispensable accomplishment; and although at first it may not seem so easy a position as the normal one, it is such a help to the balance that later on you must be on your guard or you may contract the bad habit of running constantly in this position when there is no real need for it.

In this position not only is the centre of gravity lowered, but the base of support is considerably lengthened, and the fore and aft stability is thus enormously increased. By means of it you will be able to move with perfect steadiness over ground which would almost inevitably upset you if you were to stand up in the normal position.

In this, just as in the normal position, you can consciously raise and lower yourself to allow for uneven ground, by bending or straightening the advanced leg; but this will seldom be necessary, except for very abrupt inequalities.

Even sudden changes of speed have little power to disturb your balance when you are running in this attitude. If the gradient suddenly becomes much steeper, as in Plates XVIII. and XIX., you should give a determined

plunge forwards, as though trying to get ahead of your skis. If, however, you are taken by surprise, and run suddenly on to an invisible icy patch or over a steep drop in bad light, you will probably at the worst only find your weight thrown on to the back foot, and will be able to recover yourself. On the other hand, if the speed is checked and you are thrown forwards, the back foot will tend to rise into the air, and, receiving the weight of the ski, will most likely just save you. If the check is so abrupt as to throw you right off your balance forwards, you can often save yourself by bringing, with a quick stride, the disengaged back foot to the front to receive your weight. Indeed you are almost sure to do so instinctively.

Another position, which is employed by some runners under circumstances such as I have just described, is as follows:—

The runner crouches as low as possible, almost sitting on the raised heel of the back foot; the front leg, from the knee downwards, is perpendicular to the ski, but its foot is not much farther ahead than in the normal running position; the back knee is pressed against the inside of the front leg, just above the ankle.

This attitude is less tiring to hold than the Telemark position, but is, I think, less of a safeguard to the balance when the speed changes suddenly or the ground is very rough.

All that I have just said has reference only to the preservation of the balance in a fore and aft direction. The question of lateral stability is far simpler; on all ordinary occasions it is sufficiently secured by keeping the skis as close together, and so making as narrow a track as possible.

The reason for this is not quite self-evident, but is easily explained.

If a bicycle be ridden on bumpy ground, it will not be tilted sideways as it crosses the side of an undulation, and will have no tendency to upset unless it actually side-slips.

A tricycle, on the other hand, or any vehicle with a wide wheel-base, will under similar circumstances be more or less tilted according to the angle of the ground, and will, unless it has a *very* wide wheel-base and a low centre of gravity, be easily upset by a sudden transverse variation in the angle of the ground, especially when moving fast.

The diagram shows how a ski-runner when holding his skis apart may be compared with

a tricycle, when holding them together with a bicycle.

This is not quite a fair simile, for, while the cases of the bicycle and of the ski-runner in the single-track position are exactly analogous, a man with his skis apart is not a rigid construction like a tricycle, but, by letting his knees give and by swaying his body, can adapt himself to the change of gradient.

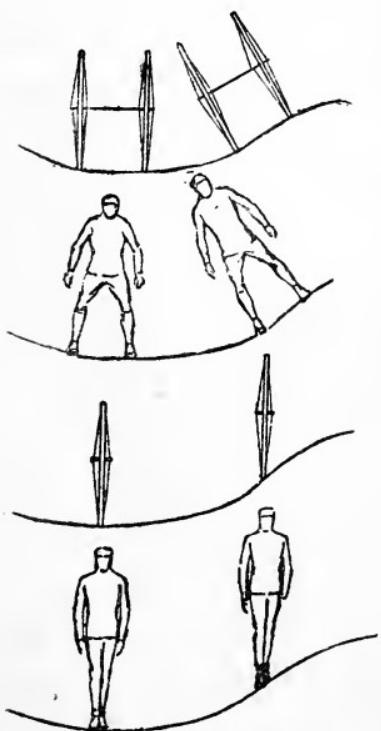


FIG. 27.

Still, the tendency is always, especially in the case of the beginner, for the legs to stiffen when they ought to yield, and on this account alone the single-track position is the safer.

There are, moreover, two further objections—and very strong ones—to separating the skis.

One is that it is impossible to run with the skis apart without holding the feet about level, instead of keeping one well ahead of the other. With the feet level the runner has far less

stability in a fore and aft direction, and, without support from his stick, can hardly hope to keep his balance in the event of a very sudden change of speed. The other objection is that when the skis are separated each one has to be kept straight independently. At a low speed it is perhaps not very difficult to do this, but at a high speed it is by no means easy, and, of course, any divergence or convergence of the skis is almost certain to cause a fall before it can be checked.

When held against each other, however, the skis, if properly made, will run perfectly straight and need no attention at all. Obviously they cannot converge, and the least inward pressure or edging will prevent them from running apart.

The single-track position, then, has many advantages. The only thing against it is its unsteadiness in the event of side-slip. But under ordinary conditions of snow, a ski, when moving straight ahead, either directly down the slope or obliquely across it, will show no tendency to side-slip, not even when, in the latter case, the slope is very steep (provided, of course, the ski be held normally, *i.e.* edged). Under such conditions you can always run with the skis held close together in either the normal

or the Telemark position, and there can be no excuse for deliberately separating them.

When running on a hard icy crust, however, it is sometimes impossible to prevent the skis from side-slipping. They are, of course, much more apt to side-slip when moving across a slope (especially a steep one) than when running straight down it; indeed when traversing a *steep* slope they may side-slip even in *soft* snow if that is shallow and rests on a slippery crust. But though they will generally run straight downhill with absolute steadiness on snow—that makes them side-slip badly when traversing, the surface may be so extremely slippery that they will side-slip even in a direct descent owing to small *lateral* undulations of the ground.

As soon, in either case, as the tendency to side-slip becomes so pronounced that you are really hopelessly unsteady in the single-track position, you will, if you still want to run at full speed, have to separate the feet more or less and hold them about level. Do not separate the feet more than just enough to steady you, and do not do it at all until you are quite sure it is absolutely necessary; try merely to separate them a little for a moment when the side-slip unsteadies you and to recover the normal *position*

Straight-running: Telemark position.—(xix.)



Straight-running: Telemark position.—(xviii.)





Snow-ploughing (stemming with both skis).—(xx.)



Braking with the sticks.—(xxi.)

instantly; some runners seem able to hold the single-track position at any speed on the most slippery snow—possibly by making imperceptible jumps to one side or another as they feel the slip begin.

When running with your feet level and apart, your fore and aft balance will, of course, be more precarious than in the normal position; you had better, therefore, lower your centre of gravity by crouching as low as you can with steadiness, *i.e.* not so low that all your weight comes on the heels or that they have to be raised at all. In the level-footed position your best safeguard in case of sudden changes of gradient or snow consistency is *not* to lean backwards or forwards, but *to move the feet forwards or backwards*, which amounts to exactly the same thing but is a much quicker process.

This may not be quite clear. Let me try to explain. As I have already said, the line from your centre of gravity to your point of support must always be about at right angles to the slope. Suppose then that you are running fast down a slope with an abrupt mound in front of you, instead of trying to readjust your balance as you pass on to the mound by leaning suddenly *backwards*, do so by still more suddenly doubling

forwards a bit at the hips and, so to speak, *lifting your feet forwards and placing them AGAINST the mound to receive your weight*. If, on the other hand, you suddenly run off a gentle slope on to a steep one, quickly hollow your back a little, and, by straightening yourself at the hips and bending your knees more, lift your feet *backwards* and place them against the slope behind you. By "lifting" the skis I do not mean actually *raising* them from the snow, but only taking the weight off them a trifle, and *sliding* them. These movements are exactly the same as those you would make if, when standing with your feet tied together, you were pushed off your balance either forwards or backwards and were then to save yourself by a little jump in the corresponding direction. *Leaning* backwards and forwards, which as it is done principally on the hinge of the ankles cannot be done quickly, may be used as a *preventive* of loss of balance, but is practically useless as a *cure*; this moving of the feet, however, is particularly useful for the latter purpose. If you try the two methods when running quickly down a very undulating icy path, you will soon decide in favour of the latter.

You can, of course, do the same thing when running in steady snow with the skis together

in the normal position, but it is then simpler and quicker to move *one* foot backwards or forwards instead of moving both.

Although, as I have said, side-slip occurs more readily when you are traversing a slope, you will then find it far less upsetting than when you are running straight downhill. When traversing in normal position with the skis together, the upper foot should lead and the weight be on the lower; with the lower foot weighted it will take a very sudden and pronounced side-slip to upset you, for as the lower ski slips the upper will receive the weight, and the sudden pressure will probably make its edge hold long enough for you to recover your balance. Moreover, you will generally, when traversing, be running pretty slowly (you can, of course, go as slowly as you like by making the angle of your traverse a very gradual one), which makes side-slip still less likely to upset you. It is, therefore, hardly ever necessary to traverse with your skis more than a few inches apart.

If you wish to run a traverse at high speed where the tendency to side-slip is very pronounced, do not make violent efforts to prevent it by edging your skis extra hard, but simply keep them normally edged with your ankles,

and especially your knees, well over towards the hill, and then *let* them side-slip if they want to. Make no attempt to lean towards the slope, but keep your weight well outwards and forwards, imagine that you are making for a spot rather *below* where your skis are pointing, and run as *lightly* as possible, cultivating, if you can, a sort of semi-sideways *floating* feeling, which is hardly describable but which you will certainly recognise if you do as I have told you.

Generally speaking, the harder and slipperier the snow the more lightly you should try to run, the softer the snow the more heavily you should try to drive your skis into it.

You can entirely disregard the hard ruts of ski tracks unless you are obliged to cross them at a narrow angle. If you cannot help doing this (which you should try to if running fast) be ready, if one of the skis or both get turned off their course, to lift one quickly and put it straight again before you lose your balance. You should never be afraid of lifting your skis, especially on hard snow; by stepping about quickly you can not only keep your balance even when running fast, but can alter your course, though in the latter case you must be careful as you put the first-lifted ski to the snow again

to lift the other *instantly*, or they will run apart for a moment and probably upset you. The greater your speed, the less of course will be the change of direction that you can make safely in one step, but by pattering round quickly you can turn fairly short when going at a good rate.

When running *straight downhill* in either normal or Telemark position either foot may lead, and you should change about, when practising, until you find you can lead as easily with one as with the other. When *traversing* in *normal* position the upper foot should lead, in *Telemark* position, the lower foot—that is to say, that in traversing the *weighted* foot should *always* be the *lower* one.

The more weight is carried by the lower ski, the less difficulty will you find in keeping the other one close to the side of it.

Should the upper ski show a tendency to run uphill, away from the other, put no more weight on it, but merely turn its inner edge slightly downwards, and press on the toe, when it will run back to its proper position.

If you have any difficulty in preventing it from running downwards, and crossing the other, you can slide it to the rear, and drop into Telemark position, lower foot leading.

Although, generally speaking, you should avoid all effort and hold yourself easily and loosely, you must, when your balance is disturbed, make every effort in your power to keep it.

One very often falls simply through expecting to fall, and doing nothing to save oneself, when a determination not to fall would carry one through.

Don't be afraid of running straight down the steepest slope, *provided the ground is open and fairly smooth, the snow easy and safe,¹ and the change of gradient at the bottom not sudden.* Remember that the pace does not go on increasing, but attains its maximum in a second or two. It is only while you are gathering way that the sensation is at all alarming; when full speed is reached—provided the ground be smooth—a steep slope feels no more difficult than a gradual one. If, however, there are any undulations—however small—you had better run down a steep slope in the Telemark position. For though on a moderate slope you might hardly notice them, or could allow for them as directed above, on a steep slope the high speed will very much increase their effect, and to run

Soft enough to give steerage way, and free from breakable crust or very soft patches that check the skis suddenly.

over a small mound may shoot you into the air if your legs happen to be rigid at the moment.

Whenever you are actually running freely and not trying to put on the brake, or stop (explained later), the very best safeguard to the balance is a desire to go faster.

Should you not happen to want to go faster, pretend you do, if you are not above such childishness.

No amount of wanting, of course, will affect your speed, but this mental attitude will enormously increase your steadiness by removing the fatal tendency to lean backwards.

Similarly, to wish to go slower will not make you do so, but will very likely be the sole cause of a fall.

Some such sentence as "This is very slow," repeated to oneself as one goes over any difficult ground, is a more potent spell than might be imagined.

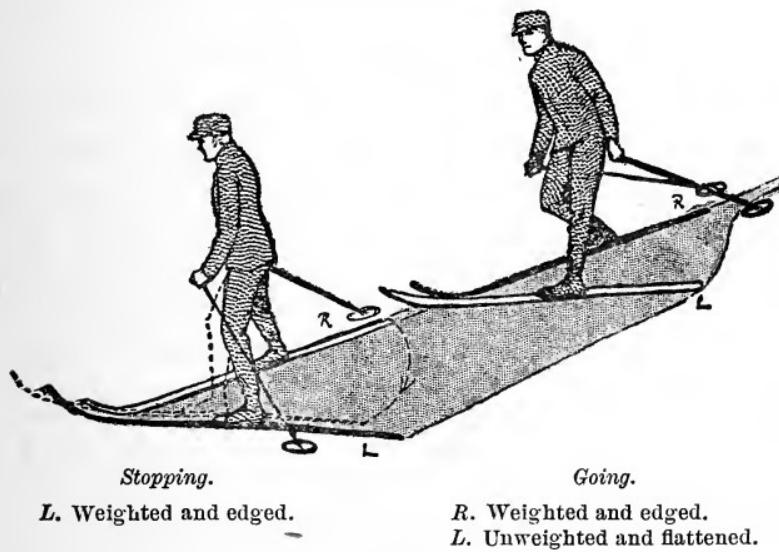
BRAKING

If you wish to reduce your speed or stop, you can, as a rule, if you are not going fast—and sometimes even if you are—do so without altering your course, by making one or both skis move more or less broadside on. Although I am only now about to describe the different ways in which this may be done, you should begin to learn them at the very outset—or even *before* you try straight-running, if you are very nervous—and should certainly not attempt to run very fast until you can brake perfectly by every method described in this chapter, and are fairly proficient in the turns to be described later on.

Single-Stemming or Half-Snow-Plough.—For this find a moderate slope on which the snow is neither very soft nor so hard that you cannot possibly traverse it without side-slipping—an ordinary practice-ground in its normal state is just the thing.

Stand with your skis horizontally across the slope; weight the lower one; lift the upper, and place it pointing steeply enough downhill to slide perfectly freely, with its tip quite close to the other's, but far enough behind it for the upper foot to be exactly above the lower one (Fig. 28).

Now lean towards the upper leg, and bend it until your weight is on it, facing towards the point of the upper ski and edging it. Then, keeping the lower leg in exactly the same position, bend its ankle outwards, and almost, *but not quite* (see p. 83), flatten the ski. The



Stopping.

L. Weighted and edged.

Going.

R. Weighted and edged.

L. Unweighted and flattened.

FIG. 28.—Single-stemming or half-snow-plough.

flattening of the ski will release you, and you will slide off in the direction of the upper ski's point, pushing the lower ski, which must still remain horizontal, forwards and sideways through the snow—*stemming* with it in fact. You can go as slowly as you like, or as fast as the conditions permit, according as you keep the stemming ski more edged and weighted or less. You can stop suddenly by throwing your whole weight on to

the stemming ski, facing round towards its point, and quickly bringing the upper ski beside it and forward to the normal position.

Now make a kick turn (a downhill one for choice), and repeat the process in the other direction, stemming with the other foot.

Practise this in both directions until you have complete control of your speed, and can stop yourself almost instantly when moving at a fair rate, remembering always to face round and bring the upper ski smartly into the normal position as you stop. Then practise it with the upper ski pointing more and more steeply downhill.

It is, of course, possible to start stemming in this way when running freely across the slope with the skis together, and when accustomed to doing it from a standstill you should also practise this, but only when running at a moderate pace, as there are steadier and easier ways of stopping when running fast.

You must, as I have said, hold the lower foot exactly below the upper one, because in that position you can push along the stemming ski with least effort, and most quickly throw the weight on it if the other ski side-slips or you want to stop suddenly. This means that the more directly downhill you go the farther forward

you will have to hold the lower foot, and the more, consequently, you will have to bend the upper leg (in order still to keep the weight on the upper ski), eventually having to lift its heel and finally to sit on it, if you are to stem almost or quite directly downhill, as it is quite possible to do.

If you find you can do all this fairly comfortably, by all means do so; if, however, you find that at a certain angle your position on the upper leg becomes very tiring or unsteady, leave this manœuvre and try stemming with *both* skis, which is also called

Snow-ploughing. — Start straight downhill, where the slope is quite gentle, in the normal running position. The moment you are moving bring your feet level, put the weight on both, raise the outer edges of the skis by bending your knees inwards a little, and, *without letting the ski-tips separate, push their heels as wide apart as you possibly can.* The legs must now be *absolutely straight at the knees.*

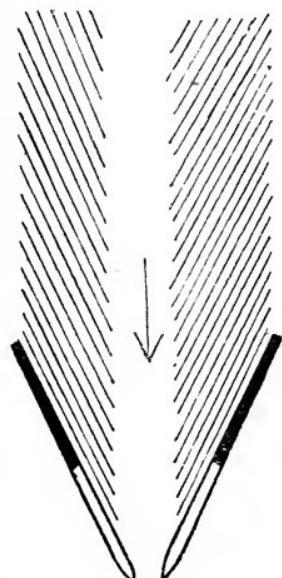


FIG. 29.—Double-stemming or snow-plough.¹

¹ The blackened parts are those which should be weighted.

If you keep your knees straight and ankles relaxed the skis will travel nearly flat—they should *never*, as I have said, be *quite* flat or their outer edges will catch and trip you—and there will be but little braking effect. If you bend your knees inwards a little, and edge your skis strongly, you will, if the slope is moderate, reduce your pace gradually and stop. On very icy snow, unless the slope is very gentle, you cannot stop by snow-ploughing, however hard you edge, but can only reduce your speed more or less. The V position is then, however, a very useful alternative to the position with the skis slightly apart and parallel as a safeguard to the balance in case of side-slip. It of course gives the utmost lateral stability (if the straddle is very wide, as it always should be), and the straight knees prevent it from being in the least tiring, while, when the skis are flattened, the reduction of speed is hardly worth considering. It is therefore usually preferable to the other position, with its tiring crouch, unless the slope is steep (and the speed therefore very high) or the ground rough, when it becomes unsafe on account, not only of its rigidity, but of its greater fore and aft instability, for with the legs in this position one cannot move the feet

quickly backwards and forwards in the way described on p. 113. On ground neither steep nor rough enough to make it unsteady, one can, if the snow is hard, safely take the snow-plough position quite suddenly when running at full speed. This is very convenient if when running in normal position one suddenly runs on to an icy patch.

On hard snow, then, snow-ploughing is only effective for braking purposes under certain conditions. In soft snow, if that is at all deep, it is almost useless—except for those who can make an abnormally wide straddle—for if in soft snow the skis are put in the V position, the inward pressure of the snow against them is so great that unless the legs can resist it almost *directly* they are forced together at once, or, at the best, have to let the skis run almost parallel, in which case there is not much object in holding them apart at all. If, however, you are one of the fortunate few who can straddle more than three quarters of their height and point their feet almost directly inwards, you will find that snow-ploughing gives you perfect control, even in soft snow, on all but the steepest slopes, and that even there you may be able to manage by throwing most of the weight on one ski and making it slide nearly

broadside on while the other points almost straight downhill, the line of your *course* being still directly down the slope, and the legs still straddled as widely as possible, and straight at the knees. You will, however, only be able to do this by paying particular attention to the edging of the weighted ski, for if it is edged either too much or too little it will not slide at all when you try to move along slowly, and will check you suddenly and throw you down when you try to stop.

It is important to remember in snow-ploughing that, whether you want to brake hard or only slightly, the straddle must *always* be as wide as possible ; the speed should depend on the flattening or edging of the skis, not on the angle between them. Moreover, if when running free with skis together you want to take the V position, you must always—even if running fast—do so as *quickly* as possible (not forgetting just to lift the outer edges of the skis *before* you push them out). Remember also that it is no use putting the feet wide apart unless *the tips of the skis are close together* (closer than Plate XX., p. 139).

You can start snow-ploughing from a standstill on a steep slope either by taking the position

of Plate XIII. and pushing the upper ski round to the proper angle *as* you throw your weight on to it, or simply by thrusting both sticks into the snow below you and leaning on them while you put the skis in position.

If, for structural reasons, you have only been able to take an academic interest in the instructions for snow-ploughing in soft snow, you can now learn a manœuvre which will enable you in soft snow of any depth to stem as gradually or as steeply as you choose down a slope of any steepness.

Telemark Stemming. — Find a steepish slope which is soft enough to prevent the least tendency to side-slip. Stand with the skis horizontal. Weight the lower, and place the upper one at an angle which will let it slide freely, as you did in learning ordinary stemming, but this time with its front bend touching the lower ankle, and its tip rather across the lower instep. Edge it normally, *kneel down on the front of it*, and slide off by flattening the other (Fig. 30). You are now stemming in what is practically Telemark position ; the object of actually *kneeling on* the upper ski is to save effort, which, of course, it does completely. It also gives the utmost steadiness. The centre of gravity being so low, you can in

this position stop yourself much more suddenly with safety than you can in either snow-ploughing or ordinary stemming, and can also more safely take up the stemming position while running freely—if, of course, you then take the ordinary

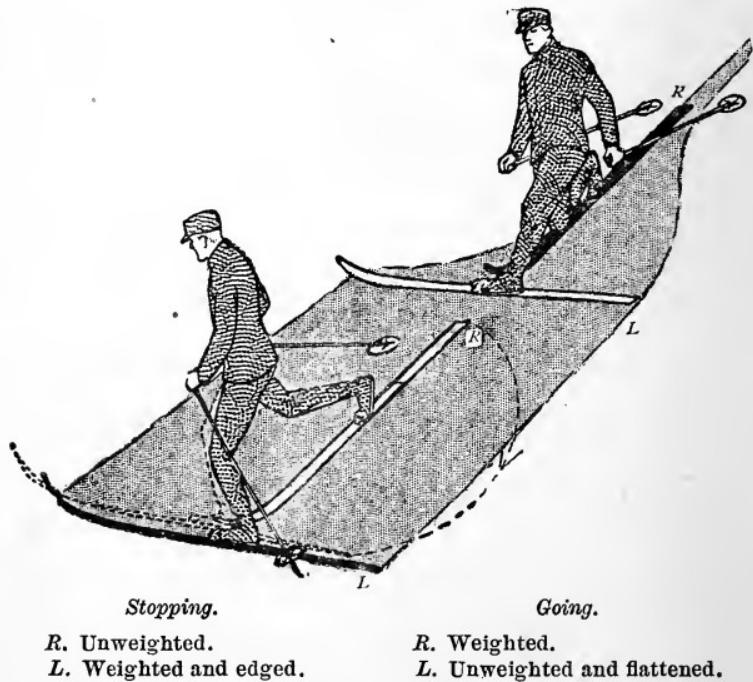


FIG. 30.—Telemark-stemming.

Telemark position and kneel right down first. In order to stem straight downhill you must place the upper ski *at right angles* to the horizontal lower ski (you may have to get it in position with your hand before starting from a standstill on a steep slope); its point will then be



Stemming with one ski, or start of a down-hill stemming-turn to left.—(xxii.)



Downhill stemming-turn to left: halfway round.—(xxiii.)



Finish of stemming-turn to left.—(xxiv.)



Unsuccessful stemming-turn to left: result of wrong balance or position.—(xxv.)



Track of downhill stemming-turns.—(xxvi.)

right across the front instep. The front leg will be quite straight and the foot, of course, turned right inwards—a position which may sound awkward, but which most people find surprisingly easy, especially on a steep slope. If you want to stop suddenly, straighten—or rather, diminish the bend of—the upper leg, lifting its knee from the ski and throwing yourself well forward on to the lower one. And always remember to face round quickly towards its point as you do so, and to bring the other ski smartly to normal position by its side.

Telemark-stemming straight downhill is not only easy in the softest snow, but also on everything but the very hardest, no matter how steep the slope.

This manœuvre, in fact, is an extremely useful one (though neither I nor, I believe, any other writer on ski-ing had the sense to realise its value until Herr Bilgeri pointed it out), and you should lose no time in mastering it—not that it takes much mastering, for the average beginner can do it with ease at the first attempt. It is no use, however, for *traversing*, either steeply or gradually, on *hard* snow, for the upper ski is then very apt to side-slip and upset the runner. Nor on *very* hard and

slippery snow is it suitable even for a direct descent, as it is then difficult to hold enough weight on the stemming ski to keep the pace down. On this sort of snow, however, as long as it gives any grip at all—and, when it does not, it is no longer snow, but *ice*, for which skis are not intended—you can descend the steepest slopes either directly or obliquely with your speed under perfect control by

Side-Slipping.—In order to side-slip straight downhill you simply stand with your skis horizontal and rather apart, and start by flattening them a little and throwing your weight well outwards, as if you wanted to go *fast* down the hill, not *slowly*. You will then *not* go fast, but *will* keep your weight over your skis and be able by edging them again to check your pace or stop when you want to. If you want to stop suddenly, give a little jump and stamp the ski edges hard into the snow. Do not be too anxious to go slowly, or in the effort to edge the skis extra hard you will probably lean towards the slope, push them from under you, and fall down. The skis must remain horizontal as they slip; if they begin to turn upwards or downwards, put weight on the toes or heels respectively. If by weighting the toes

you make the skis point downwards a little they will slide forwards as well as sideways, and the more they are then edged the more they will move forwards in comparison with their sideway motion. By side-slipping, therefore, you can traverse slowly at any angle you choose if the slope is fairly steep.

You can also stop yourself by side-slipping if you wish to when running a free traverse in normal position. You merely have to make the skis side-slip and instantly put your weight on the heels until they turn uphill a little, when you can again edge and stop them.

A little practice will make the whole manœuvre almost instantaneous ; it is then really a Christiania swing (see p. 175), and, if the snow is not very soft, is a far quicker and easier way than ordinary stemming or stopping or checking the pace for a moment. Throw your weight well outwards to keep it over your skis as they side-slip ; your tendency at first will be to fall towards the hill.

If you ever wish to make a stemming traverse at a *steep* angle on a *moderate* slope where the snow though hard is not quite slippery enough for you to side-slip down it, you may be somewhat at a loss. In the Telemark position you

will find a tendency to side-slip, and you may, in the ordinary stemming position, with the lower ski held horizontally and the weight on the upper one, be unable to manage the necessary squatting attitude comfortably. You can then traverse in something between the ordinary stemming and the snow-plough positions with the upper ski edged outwards and pointing the way you are going, but with the weight almost equally distributed between it and the lower, which points somewhat downhill instead of horizontally and is held with its tip level with the other's, not ahead. The upper knee must be bent, the lower straight.

We have so far talked only of hard and soft snow, but the snow surface is sometimes a breakable crust, into which the skis cut, and in which no sort of stemming is possible. Your only way of going slowly in this is to traverse at a very slight angle ; if you then want to stop, you must *step round*—that is, you must lift the upper ski, put it down again pointing horizontally across the slope, and *instantly* lift the lower and bring it down parallel with the first. Be careful to throw your weight well upwards and forwards as you put down the upper ski, and not to let the lower remain on the snow for

a *moment* after the first has been brought to it again ; it is safest to give a little jump from one to the other.

Either by stepping round, or by any sort of stemming, you can of course make a change of direction when traversing if the gradient of the slope varies ; as you pass on to steeper ground, for instance, you can weight the heel of the stemming ski for a moment until it is again horizontal, at the same time flattening the running ski a little and letting it slip down to the angle at which it was pointing before. This is really an embryo swing, as you will see later ; one important reason, in fact, for learning all the methods of braking thoroughly is that they are the elements of which the swings are composed, each variety of swing or turn being either a development of one method of braking, or a combination of one with another.

When you become more expert you will not often have to stem while *traversing* if the ground is open, though even then you will often find it convenient to brake in one way or other when going straight downhill. In thick wood, however, you will find it indispensable to be able to go at a moderate speed in all sorts of snow and at any gradient. It is also worth re-

membering that to stem straight downhill at an ordinary pace is a comparatively *fast* process. It is not so pretty and needs much less skill, but it is *quicker* than running freely in tacks of an ordinary gradient and connecting them by downhill turns (explained later).

When running down a narrow path or the like it is sometimes impossible to brake effectually, as there is not room to put the skis in a wide V position or to Telemark-stem; it may then be permissible to use the stick or sticks as an aid. Plate XXI. shows a way of doing this. The arm supported against the thigh gives a firm purchase—firm enough, in my experience, to hurt the wrist a good deal if the points of the sticks catch something hard. This manœuvre is hardly ever necessary unless the path is very icy; if there is much of this, and you want to go slowly, you may just as well walk with your skis on your shoulder.

When you can do all that has been explained so far, you may (if you have steadily refrained from using your stick except as I have directed) consider yourself quite a respectable ski-runner in a small way. There will be nothing to prevent you from going for any expedition of which the uphill climb is within your powers, for whether

you are going uphill or downhill, there is no sort of ground that cannot be negotiated by one or other of the manœuvres that I have described.

But, though a perfectly efficient tourist, you will not be a very fast one downhill until you have learnt how to stop and steer yourself in any sort of snow, *when running fast*, and will tire yourself unnecessarily on steep or difficult ground until you can run in zigzags without coming to a standstill between each tack.

The different ways of doing these things are described in the following sections.

THE STEMMING TURN

I must here apologise for the extreme ambiguity of ski-ing terminology, which, however, as I did not invent it, I have not the moral courage to try to improve. The term "stemming" may be used in several different senses. In its narrowest sense it means holding the skis in the V position and braking with *one* of them. More broadly it means braking with *both* in the V position. It also means braking with the skis in Telemark position. In fact in its broadest sense it means any sort of braking except side-slipping with the skis parallel.

In this sense almost any method of turning on skis might, as we shall see later, be called a "stemming" turn. The expression "stemming turn," however, is generally used in a special sense to denote a turn during which the skis are held in the V position with the feet nearly level.

By means of a "stemming turn" you can, as you already know, turn *uphill* or stop when traversing; you can also do so from a direct descent. You can, moreover, turn *downhill* from



Downhill stemming-turn to left in soft snow (note wide stride and edged skis).—(xxvii.)



How *not* to make a stemming-turn.—(xxviii.)

a traverse until you face in the opposite direction and run off on a new tack.

This turn is effected by putting the skis in a more or less wide V position, and either simultaneously or immediately afterwards *weighting* and slightly advancing the one that is to be outermost in turning. To show how in this as in all turns the various factors of side-slipping, with the weight variously distributed, combined steering action of both skis, edging, &c., come into play according to circumstances, it will be necessary to describe in detail the two different uses of the turn.

For practising these turns find a moderate slope and snow in which it is easy to stem when running straight downhill; a much trodden practice-ground is the very thing.

Uphill Turn to the Left.—You already know how to turn uphill from a traverse by stemming; the following way of doing it is slightly simpler. Traverse to the left at an easy gradient in normal position, weight on right foot. When you want to turn, draw the upper ski a little to the rear (Fig. 31, 1) and then push the heels wide apart, straightening both legs and putting all the weight on the lower heel (Fig. 31, 2 and 3). As the lower ski begins to turn uphill, bring

the other one smartly to its side again in normal position.

This is much the same thing as stopping when stemming with the lower ski, as described above (page 121), but is rather simpler, for the uncomfortable crouching position necessary when stemming with the lower ski is avoided, there is no shifting of the weight from one ski to the

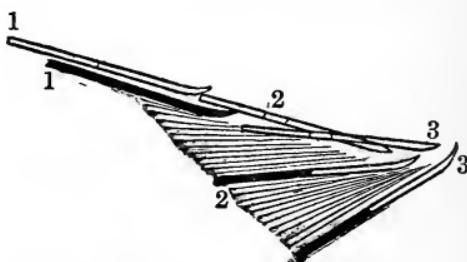


FIG. 31.—Uphill stemming turn to left.¹

other, and the preparatory movement of drawing back the upper ski can perfectly well be made simultaneously with the actual turn.

To make an uphill stemming turn when running across a slope in normal position is rather a clumsy process, and it is quite unnecessary to spend much time in practising it, for an uphill turn from a traverse can be made more easily and effectively by the Christiania swing, in the way already explained, or the Telemark, which will be described later. Just make sure,

¹ The blackened parts are those which should be weighted.

however, that you *can* turn uphill in this way from a traverse in either direction, and then try the turn from a direct descent, as follows.

Run straight downhill in the stemming position with the weight equally on both skis and the feet as wide apart as possible, taking care that the legs are quite straight at the knee, and rigid (Fig. 32, 1).

In order to turn to the left (most people find it easiest to learn to turn to this side first) you have simply to throw all the weight on to the heel of the right foot and turn the body to face the point of the right ski. You will begin to turn to the left, and as you do so the left foot will involuntarily fall slightly to the rear (2), when the steering action due to the relative position of the skis will help the turn.

If you keep all the weight on the heel of the right foot you will go on turning until the right ski points slightly uphill, when you will come to a standstill (3). As you do so,

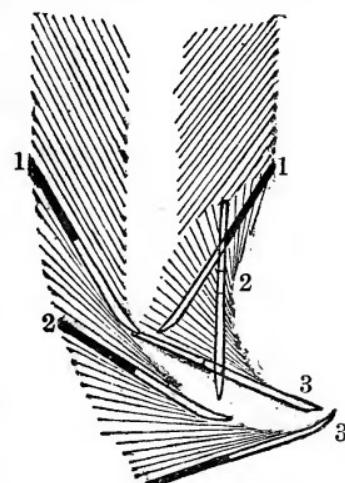


FIG. 32.—Uphill stemming turn to left.¹

¹ The blackened parts are those which should be weighted.

be sure to bring the inner ski quickly to the normal position.

This is extremely simple, and, if you keep both legs quite straight and the feet wide apart, you can hardly fail to do it correctly.

The mistake you are most likely to make is that of letting the left knee bend as you begin to come round. If it does so the left ski will get on its outside edge, and, instead of continuing to skid round, will only run in the direction in which it is pointing, so that if it does not run across the other (Plate XXV.), and throw you down,¹ you will find yourself running obliquely across the slope, stemming with the right ski only instead of turning uphill and stopping.

It is not sufficient, however, to keep the inner leg straight, for unless at the same time you keep nearly all weight off it, either the left ski will get in front and you will begin to face downhill again, or it will get too much on to its inside edge, and will at least prevent you from finishing the turn, even if it does not trip you up.

As soon as you can turn to the left in this

¹ If, when one ski crosses the other, you put (or keep) *all* your weight on the one that is undermost, you can easily withdraw the other and save yourself from falling.

way, learn to turn to the right, of course substituting "right" for "left" and "left" for "right" in the directions.

If, while running straight downhill, you turn and come to a standstill in the way I have described, you will, when you have stopped, find yourself a certain distance to one side or the other of your original course.

This may not always be convenient ; you may, for instance, want to stop while running down an icy road, fenced on each side, and so narrow that you have only just room enough to stem, and would run into the fence if you swung to one side in stopping.

In a case of this sort you can turn suddenly and stop in your tracks in the following way :—

Suppose you are running straight downhill in the double-stemming position ; when you want to stop, give a vigorous push with one foot—say the left—and so throw all your weight *suddenly* right outwards on to the heel of the right foot, turning the body quickly well round to the left as you do so. If this is done with force and decision the right ski skids round quickly to a horizontal position, and as it does so, the left ski comes into the air, is lifted smartly round, and brought down parallel with and close to the

other one. You then find yourself at a standstill, facing to the left across your original track, but without having moved to one side of it (Fig. 33).

Just at first you may fail to do this properly

through giving a timid, jerky push with the left foot instead of a steady thrust. This will prevent your weight from going sufficiently outwards over the right ski, and the left ski will come to the snow again before you have had time to lift it round to the side of the other one and before that one has had time to skid round to right

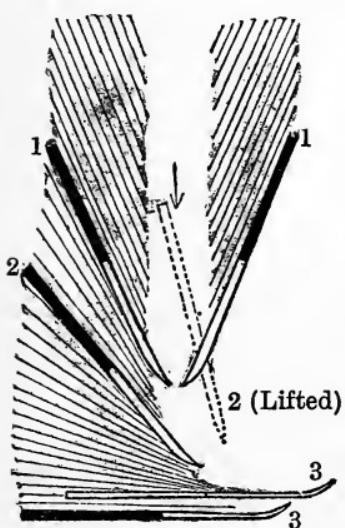


FIG. 33.—Uphill stemming turn to left.¹

angles with your course. After a very few trials, however, you should be able to do it correctly, and you will then find that no great force is necessary, and that the movement need not even be made particularly quickly provided it be done with a free swing. In order to give the push you must, of course, bend the inside knee slightly.

Provided the inner ski is brought *parallel* to

¹ The blackened parts are those which should be weighted.

the outer one, it does not matter if it comes to the snow again *before* the latter has skidded round to right angles, for then the turn can be finished with both skis side-slipping together—that is to say, the turn can begin as a stemming turn and finish as a Christiania, a most useful combination which is beginning to be known by the dreadful name “Stemmiania,” which I only quote in order to record my dislike for it.

This way of making the turn is practically instantaneous, and is so convenient that when you have once learnt it you will hardly ever use the one I described first. By means of it you can stop suddenly when moving at a very fair rate, especially if you stem hard with both skis well edged inwards just before making the turn.

Practise this movement without skis at first, and then at a standstill with skis, on the most slippery snow you can find, trying to make the outer ski spin right round to right angles.

These uphill stemming turns enable you to stop yourself wherever the quality of the snow and the gradient allow you to hold the double-stemming position while running straight down-hill. It is no use attempting to make them on very steep slopes or in snow into which the skis sink deeply; in either of these cases you will

have to stop yourself by means of the Telemark or Christiania swings, described later.

I need hardly say that if you merely wish to alter your course and not to stop yourself, you can finish the turn at any point. You either wait until the outer, weighted ski is pointing in the direction you want to go, and then bring the other ski parallel to it in the normal position and run on at full speed; or, if you still wish to brake, you turn rather farther until the inner ski is in line with your intended course, and then shift the weight partly or entirely to that one and run on stemming.

Downhill Turn to the Left.—A turn made in a downward direction in order to join one tack to another when descending a hill in zigzags is often called an “S” turn, on account of the shape of the track left by a number of these turns made in alternate directions (Plates XXVI., XXXIII., XLII.).

Any downhill turn, therefore, whether made by the stemming turn or by any other means, can be called an “S” turn. A good many people, however, having never seen a downhill turn made by any other means than the stemming turn—or at least the awkward manœuvre which the average runner imagines to be the stemming



Uphill Telemark swing
to left: wrong balance
and position of skis.
—{xxx.}



Uphill Telemark swing
to left.—{xxix.}



Uphill Telemark swing to left (seen from above).
—{xxxx.}



Downhill Telemark swing to left.—(XXXII.)



Track of downhill Telemark swings.—(XXXIII.)

turn—believe “S” turn and stemming turn to be synonymous.

As will be seen later on, a downhill or “S” turn can quite well be made by means of the Telemark or Christiania swings, the “S” having no reference whatever to stemming.

To avoid confusion, I shall not use the term “S” turn at all, but only speak of a downhill turn.

The best way to practise the turn at first is to run, as before, straight downhill in the double stemming position for a few yards, then throw the weight on the left ski as if you meant to turn uphill to the right and stop (Fig. 34, 1 and 2), but just before the left ski points horizontally across the hill, transfer the weight to the heel of the right foot, and face round to the left a little.

You will find yourself beginning to turn down-

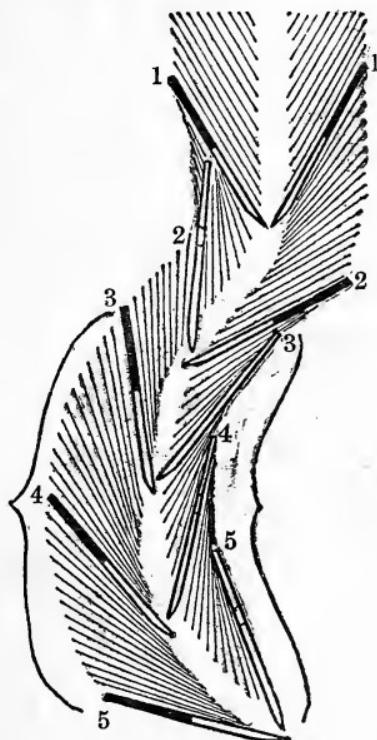


FIG. 34.—Downhill stemming turn to left (3, 4, and 5).¹

¹ The blackened parts are those which should be weighted.

hill again—the left ski falling a little behind the other as you do so—and by keeping the weight on the right foot you will go round until you face across the slope in the opposite direction (Fig. 34, 3, 4, and 5), when you can shift the weight to the left foot and reverse the process.

By repeating this you will descend the hill in short zigzags.

The important points are—(1) to hold the stemming position unaltered with the knees straight, the heels of the skis wide apart, and the tips close together; (2) to throw the weight well on to the outer ski; and (3) not to let the inner ski get in front.

The last half of the turn, from the point at which you are facing straight downhill, is, of course, really an uphill one, identical with what you have already learnt, and can be finished at any point in any of the ways already described.

You can start a downhill turn, like an uphill one, from the normal position while running across a slope, and under these conditions the turn is, as in the case of the uphill one, rather less easy; this time, however, it is extremely important to be able to do it, for this is by far the most useful application of the stemming turn, and you can in this way, provided the snow

be suitable, join one tack to another on a slope of any steepness, where it would be impossible to run straight downhill in double stemming position.

Suppose you wish to start a downhill turn to the left while running at a gentle gradient across a slope in the normal position (*i.e.* with the weight on the left foot and the right foot in front), the first thing to do is to turn the right knee and ankle inwards so as to lift the outer edge of the ski as much as possible. Then, keeping the point of the right ski ahead of the other, push its heel uphill and out to the position of 2, Fig. 35, B, at the same time weighting the toe of the *left* foot and slightly flattening that ski, which will then begin to point downwards and give the other more room to turn. As they turn downwards push their heels wide apart and throw your weight quickly outwards so that a final thrust of the left leg sends it *full on to the right heel* just as you face straight downhill. Almost simultaneously lift the left ski round to the side of the other and finish the turn with the skis parallel.

As you lift the inner ski turn (*not lean*) the body inwards just enough to face squarely towards the point of the outer ski.

If you turn slowly there will be an interval between the pushing round of the outer ski and the final thrust of the inner leg during which the skis will be equally weighted. If you turn sharply while running fast the checking of the outer ski's speed as it comes broadside on will throw the weight on it at once and lift the inner ski without an effort.

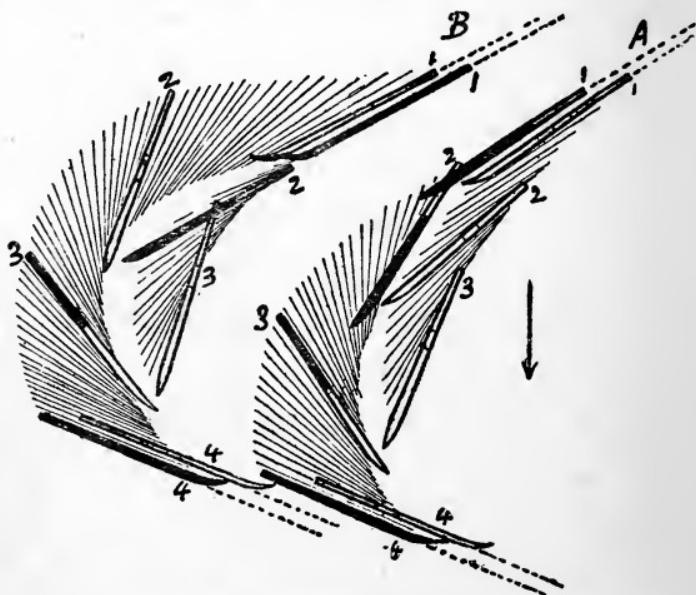


FIG. 35.—Downhill stemming turn to left (two methods).¹

It is also possible to make the turn by putting the weight on the outer ski *before* it begins to stem at all, and making it turn downhill by pressing on the toe (as in Fig. 35, A). I used to think this method the easier of the two, but

¹ The blackened parts are those which should be weighted.

have changed my mind about it, and can only apologise for leading people astray.

Up to this point you have been practising on moderate slopes only, but it is on steep slopes that you will generally have to use the downhill stemming turn, and it is on steep slopes that you should practise it the instant that you can do it neatly on a gentle one.

You will then find a difficulty that has probably not bothered you much so far. On a steep slope, as you begin to turn downhill, the increase of speed is sudden and considerable, and if you do not compensate for this by throwing the weight more and more forwards, the skis will shoot from under you, and you will sit down.

Don't, however, begin leaning downhill *too soon, while still facing across the slope*, for that will throw the weight on to the inside (lower) ski. Simply lean as far forwards over the front of your skis as possible, so that as they turn downhill your weight will be well over them.

The difficulty of leaning forward sufficiently on a steep slope is partly due to the tendency to stand with the weight vertically above the feet, as one would do when *walking* downhill. The very best plan for overcoming this difficulty,

and one which will make it infinitely easier for you to perform the turn quickly and correctly, is to keep your eyes fixed on the ground at your feet while you are turning, and to imagine that it is almost or quite level. You will then naturally hold yourself at right angles to the slope no matter how steep that may be.

You will find this downhill turn of very little practical use on a steep slope until you can make it quite shortly and sharply; for if you make a long curve, the pace increases so much in the middle of it that you are almost sure to lose control, and fail to finish the turn, even if you do not fall down.

The reason why to lift round the inner ski at the middle of the turn is safer than to keep it on the snow throughout is because the curve is thus considerably shortened.

The act of suddenly throwing yourself very far forward over the front of your skis as you face downhill will make them hang back a little for an instant—all the more so for the fact that at this point the stemming action of both is at its maximum—and at this moment it is easy to give a push with, and then to lift round, the inner ski.

Be careful, in lifting the ski round, to bring

it down again exactly parallel to the outer ski ; for the inner one, if it comes down pointing *towards* the outer one, will instantly run across it and upset you ; while if pointing *away*, it will run uphill and draw your feet apart with a jerk that will probably have the same result.

Although, as I have said, you should turn the body a little in throwing the weight outwards, it is no use attempting to lean or swing it the way you *want* to go. You must simply throw it forwards and *outwards*—that is, rather *away* from where you want to go. If you lean the way you want to go you will simply put weight on the inner ski, which will then either trip you up or make you run away straight downhill instead of finishing the turn. Indeed, paradoxical as it may sound, you should, in a sense, try *not* to turn ; manœuvre your skis as I have directed, and *try to keep a straight course, turning sideways as you do so*, and you will probably come round without difficulty.

The faster you are running at the moment of beginning the turn, the more difficulty you will at first have in making it.

You had better, therefore, when learning it, run at a gradient which will only just allow you to keep moving smoothly (I am speaking

of the gradient of your course across the slope, *not* of the gradient of the slope itself), otherwise, before beginning the turn, you may be inclined to stem with the lower ski in order to check the pace, and, when the lower ski is put in stemming position before the other is pushed round, there is a tendency for the weight to get too far back in the effort of starting the turn, which then misses fire. If you are bound to slow up before you begin the turn, do so by side-slipping with both skis and turning a little uphill (*i.e.* make a slight Christiania swing) as described in the last section, p. 131. -

On an icy and steep slope it is, of course, especially necessary to make the turn very sharply if you are not to lose control in the middle of it. You can do this by running very slowly before turning, and then quickly putting the upper ski far round, and simultaneously weighting it by means of what is practically a *jump* from the other ski, which comes into the air almost before the first is weighted, and is brought down parallel with it almost instantly. This is well worth practising assiduously, for it makes all the difference to the safety of a turn on very steep and icy ground.

Do not be contented until you can make a

short, sharp turn (both to right and left, of course) with perfect steadiness, on the steepest slope you can find. For although on steep slopes a Telemark or Christiania swing is the best way of making an *uphill* turn, there is no means so reliable as the stemming turn for turning *downhill*, no matter how steep the slope, *provided the snow is hard, or that, if soft, it is shallow*. It is almost useless, though, to attempt it in deep soft snow. At the best you will probably only get half-way round with an uncomfortable effort, and then the inner ski will be forced back, and come round after the other in Telemark position, in which, as you will find later, it might just as well have started.

At the worst you may be tempted to drag yourself round with the stick in the position shown in the photograph (Plate XXVIII.).

This position, which, I hope, is becoming less fashionable, is the very essence of incorrectness and awkwardness, and is an infallible sign either of poor nerve or of bad teaching. Here the weight falls principally on the inside ski and the stick, instead of entirely on the outer ski, while the skis are held parallel, or nearly so, instead of in the V position. The general position is a crouching one with the knees

bent, instead of an erect one with straight and rigid legs; except for a feeble stemming action of the outer ski, which is too much edged, the turning effect is entirely due to the drag of the stick. Those who make use of this method generally refer to it as a stemming turn, "S" turn, or Alpine curve, using either of these terms in contradistinction to the terms "Telemark" and "Christania," evidently under the impression that an "S" curve can only be made by stemming, and that by means of the Telemark or Christania it is only possible to turn uphill and stop. The only correct title for this manoeuvre is "stick turn."

When I say that this method is awkward and incorrect, I do not merely mean that it is ugly, for I suppose that to the unsophisticated eye its attitude is no more ugly than the exaggerated straddle of the correct stemming position. There are two strong reasons for considering it execrable in style and utterly to be avoided.

In the first place it is a waste of energy, because it takes a considerable muscular effort to make a turn in this way, even when the snow is easy, and an exhausting one when it is not; while by substituting correct methods one can always turn without the smallest strain. The

second objection to it is that it is inefficient, for by turning in this way it is impossible to make a short curve, especially in deep soft snow; and until a runner can turn sharply in snow of any quality and on a slope of any steepness (I do not say at any speed), he by no means can be said to have proper control of his skis. I do not for a moment deny that it is the easiest way of turning, in the sense that it is the one requiring the least skill. But any one who knows what can be done by correct methods, who has ordinary nerve, and who does not look on ski-running solely as a means of locomotion, for which a technique demanding the minimum of skill is the one to be preferred, will shun the "stick turn" as he would the pestilence.

Finally, let me remind you once more that in stemming—and this holds equally good whether you are turning or going straight ahead—the skis should never be quite flat; their outer edges must be lifted a little even when the snow is easy, rather more so when it is not (see p. 83).

To be quite accurate I ought to have said the skis must not be *kept* flat, for obviously they must during a downhill turn each pass through the flat position, since their edging, on the tack

before the turn, is the reverse of what it is on the tack that follows it. This change of edge, as a matter of fact, constitutes one of the difficulties of the turn. The outer ski makes the change easily enough, for the outer ankle (which is bent inwards in order to start the turn) does not have to alter its position while the change of edge takes place. But the inner ski, if kept on the snow throughout the turn, is by no means easy to manage at the moment that the change has to be made. This ski remains on its inside edge until nearly the end of the turn, and if allowed to remain so for a moment too long is very apt to catch on this edge and run across the other or refuse to come round, especially on a steep slope, if (as he should have done) the runner has made a very wide straddle when facing straight down-hill.

This difficulty is entirely avoided when the turn is finished by the *lifting* of the inner ski (the change of edge then taking place, so to speak, in the air). Indeed, although this lifting of the ski may sound somewhat acrobatic to any one who has not tried it, it is really quite the reverse. It needs far less adroitness than does a neat and steady finish of the turn with the ski kept on the snow, and is, in fact, not only the

quicker and more effective, but also considerably the easier and safer of the two methods.

The runner can only make a true stemming turn when going at a moderate pace. By finishing it as a Christiania, however, he can turn either uphill or downhill when going much faster. In fact the sooner the skis are brought parallel, the greater the pace at which the turn can be started ; at very high speeds only a trifling preliminary stem being either necessary or safe.

Short Directions for a Downhill Stemming Turn to the Left.

From normal running position, right foot leading, left weighted.

Bending and turning inwards right knee, ankle, and foot, push heel of right ski outwards and forwards to the widest possible stemming position —its tip close to but ahead of the other's—at the same time slightly flattening the *left* ski and pressing on its *toe*. As the skis turn downwards push their heels wide apart, quickly shift your weight forwards and outwards, and, with a push from the inner ski, throw it *full on the right heel* as you face straight downhill—at the same time lifting the left ski quickly round to the side of

the other and finishing the turn with the skis parallel.

When moving slowly this is to be done in two motions; when moving fast, in one continuous one.

Fix the eyes on the tips of the skis and try to lean in that direction only, not inwards.

N.B.—The latter half of this turn is, of course, really an uphill one, separate directions for which are therefore unnecessary.



Starting an uphill Christiania swing to the right from traversing.—(xxxiv.)



Starting an uphill Christiania swing to the right from a direct descent —(xxxv.)



Finish of uphill Christiania swing to right.
—(xxxvi.)



Bad finish of uphill Christiania swing to right.
—(xxxvii.)

THE TELEMARK SWING

Although by stemming you can make either up or downhill turns with perfect ease either on a hard icy surface or in shallow loose snow, you will find it very difficult, if not impossible, to make a stemming turn in loose snow of more than a certain depth or density—unless you drag yourself round with the stick. By means of the Telemark swing, however, you can easily make turns in any sort of loose snow, and can do so on any slope, no matter how steep it may be.

If you can already both run and stem in the Telemark position, with either foot leading, you will find it a very simple matter to learn the swing. In fact you may be said to have *learnt* it after a fashion, for to stop by Telemark stemming is to make a clumsy Telemark uphill turn. For practising this swing, find a moderate slope where the snow is soft and, for choice, deep or dense enough to make a stemming turn difficult.

Uphill Turn to the Left.—Run at a gentle gradient across the slope with the hill on your left and the weight on the lower (right) foot,

not, however, in the normal position, with the left foot advanced, but in the Telemark position, with the right foot leading.

The left ski should then be so far back that its bend is level with the right ankle, the left heel

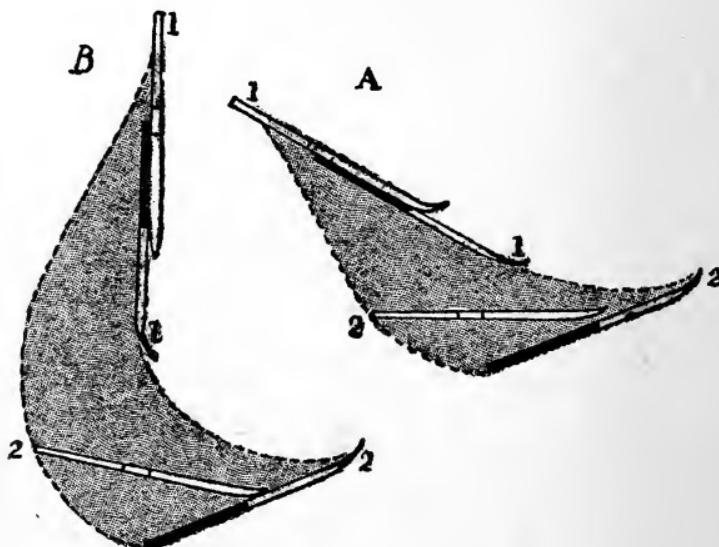


FIG. 36.—Uphill Telemark swings to left (A from a traversing, B from a direct descent).¹

should be raised, and the left leg perfectly relaxed, with the knee nearly touching the ski. The right knee should be perpendicularly over the foot, and *both knees be pressed inwards*. This is only preparatory, and you should, in this position, be able to run directly across the slope at whatever gradient you choose.

¹ The blackened parts are those which should be weighted.



Start of a downhill Christiania swing to right.—(xxxviii.)



Bad finish of uphill Christiania swing to right.
—(xxxix.)



Uphill Christiania swing to right (seen from above).—(XL.)



Finish of uphill Christiania swing to right (seen from below).—(XLI.)

As soon as you are fairly under weigh, make the swing as follows :

Turn the right knee and foot a little inwards, placing the front ski slightly at an angle with the other ; at the same time edge the right ski inwards and put the whole weight on the right *heel*, pressing it down and trying to lift the toes.

You will at once begin to turn uphill. The moment you start turning lean *more forwards* and face full towards the point of the front ski. As you stop moving weight the toe of the front foot, press the back knee inwards, and so bring the skis parallel.

Unless you are on the look-out for it, you will find a tendency, as you begin the turn, to lean inwards (towards the hill), or backwards, putting weight on the left foot, and at the same time to straighten the right knee and relax the right ankle, more or less flattening the ski (Plate XXX.). As a result you will, if you do not fall inwards at once, probably finish the swing in an awkward straddled position, the right ski pointing uphill, almost at right angles to the other ski, which will not have altered its direction, and the weight on both feet. Or else you will find that the weight on the left ski will make it run up level with the

other again, which will prevent you from turning, or across it, which will throw you down.

It will help you to avoid this inward lean if you remember that, as explained on p. 82, your right ski in turning does not cut round directly as a skate does, but slips sideways as well as forwards, and that, therefore, during the swing your right *foot*, instead of moving more and more to the left of your original line of progress, will at first move to the right of, or below it; and, if the hill is steep or the snow shallow, will hardly be above it even at the end of the swing. It is obvious, then, that if you are to remain properly balanced on your right ski, very little inward lean is necessary, and the usual directions for leaning the body inwards while making the swing are most misleading. In fact, although one really has to lean inwards when the turn has begun, the instinct to avoid an outward fall makes one overdo this to such an extent that at first it is better to try to throw the weight rather to the right and outwards, downhill (but well *forwards*), in order to get the proper balance.

In the Telemark swing the edging of the leading ski is an important factor in the turn, and there is more forward motion in proportion

to the side-slip than in the stemming turn, which is almost entirely a skidding turn. Indeed, when the swing is made while running fast in deep soft snow (which reduces the side-slip to a minimum), the runner, as he comes at right angles to his original course at the end of the swing, may find it necessary to lean consciously inwards, but only at the end—*never under any circumstances at the beginning of the swing.*

In this swing, as in the stemming turn, it is a mistake, when practising, to look the way you *want* to go, as is sometimes advised. You must only look *the way you are actually going at the moment*—i.e. rather to the outside of the point of the leading ski.

It is also useless to try to *force* the turn by swinging the body or in any other way; and, as in the stemming turn, it is better to think nothing at all about turning, simply confining your attention to the weighting and position of the skis, and trying, in a sense, to go straight on. The great thing at first is to prevent the weight getting back on the back foot.

There is, of course, no real necessity for running in the Telemark position before beginning the swing, but to do so whilst learning it gives you

less to think about when starting the turn. As soon as you get a little accustomed to it you can run in normal position with the upper foot leading until you wish to turn, and can then drop into Telemark position, lower foot leading, and begin the swing simultaneously.

When you can make the swing to the left, run across the slope in the opposite direction, and learn to make it to the right in the same way (of course substituting "left" for "right" and "right" for "left" in the directions).

When you can do this, practise it to the left again, this time running more directly downhill than at first, and then in the same way to the right, until you can at last swing to a standstill either right or left when running *straight* downhill (Fig. 36, B). But do not, at any stage, run far before beginning to swing; get fairly under weigh and make the swing, then run on and do it again, and so on until you have gone as far as you wish. In this way you will get less climbing uphill in proportion to the amount of practice.

It is at the end of a swing made when running straight downhill that you are almost sure to find it necessary to lean inwards if the snow is deep and the speed high, but till you find a

distinct tendency to fall outwards you need not concern yourself about it.

Of course, instead of coming to a standstill at the end of a swing, you can, if you wish, stop turning before the leading ski comes to a horizontal position, and can run on obliquely down the hill. In order to do this you have only, as soon as the leading ski is pointing the way you want to go, to shift the weight from the heel to the toe, stand erect, and bring the back ski to the front in the normal position.

As soon as you can swing both to left and right when running straight downhill, learn to make a downhill turn ("S" turn), which will enable you to join one tack to another when descending a slope in zigzags.

Downhill Turn to the Left.—In this use of the swing the skis are held as before, and weighted in much the same way, but there are one or two points to be noticed.

Run across the slope at a moderate gradient with the hill on your right, in Telemark position with the right foot leading (or start in normal position, and when you mean to turn, shift the weight from left foot to right and drop back the left ski).

Then, lifting the outer edge of the right ski,

turn the right foot and knee inwards, and so place the ski at a slight angle with the other, as in starting an uphill swing. But, while in an uphill swing this angle should be very slight indeed and the body should *immediately* turn towards the point of the front ski, in a downhill

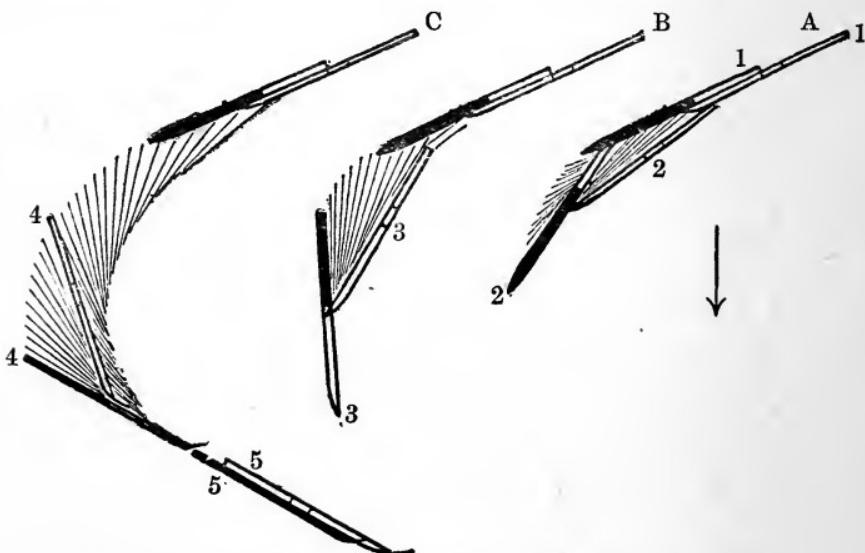


FIG. 37.—Downhill Telemark swing to left at various stages.¹

swing the angle must be a trifle wider, and the body must remain facing the point of the *back* ski until both have turned far enough for the front one to point nearly straight downhill. The stemming of the front ski, in fact, and the combined steering action of both, which in an uphill turn should hardly be perceptible, should in a

¹ The blackened parts are those which should be weighted.

downhill one be more pronounced. The weight, moreover, must just at first be placed on the *toe* of the front foot to help that ski to turn downwards.

The moment you are fairly heading downhill, throw the whole weight on to the *heel* of the front ski, face towards its point, and finish the swing as before (Fig. 37).

The faster you are running at the moment of beginning the swing, the sooner you can transfer the weight from the toe to the heel, and face in the direction of the leading ski; in fact, from a *very* fast traverse, a downhill Telemark swing is practically made in exactly the same way as an uphill one, the preliminary stem of the front ski and the weighting of the toe being barely perceptible.

In putting the weight on the toe at the beginning of the swing, take great care not to poke the foot forward, but to keep the knee well over it; otherwise you are sure to take the weight right off it.

Be on your guard also against the tendency to try to start the swing by *leaning* to the left, for, if you do this, you will either fall downhill or get the skis apart. Simply lean well forward, look in that direction only, and don't think of

trying to turn, but rather try to go on across the slope, letting your skis carry you round.

As you turn downwards of course the pace increases, and you must lean more forward, but you will find it less difficult to do this sufficiently during the Telemark swing than during a stemming turn. The great secret is to keep the right knee well forward over the foot, to try to lean over the front of the ski, and to keep your eyes on the ground at your feet, trying to imagine it flat, as I advised in the case of the stemming turn.

The Telemark swing, when executed correctly, at high speed, requires no sustained muscular effort except that of holding the leading ski on its inside edge and pressing down the heel. In deep soft snow this is easy enough, if the knee is well over the leading foot and all the weight on that ski, but in shallow snow it is sometimes difficult, at a high speed, to prevent the ankle from bending outwards, which flattens the ski and makes it skid outwards with an irregular, jerky movement, leaving the weight on the back foot. To prevent this, press the knee in well, turn the outside of the foot hard upwards, and press the toe upwards against the toe-strap.

This will give the sensation of grinding the inner side of the heel into the snow, and you should try to increase the pressure as the swing proceeds.

Strictly speaking, a very slight flattening of the front ski hastens the start of an uphill swing *from a traverse*. But this flattening should be merely momentary, and it is so difficult to make it so and *instantly* to edge the ski again that it is safer to leave it out altogether.

Neither allow the back ski to come forward to the normal position, nor weight it until the swing is quite finished and you are either standing still or running off in a new direction.

It may seem that, owing to the position, the Telemark swing calls for more delicate balancing than the other methods of turning. There is really not so much difference, for in either the stemming turn or, as will be seen later, in one form of the Christiania swing, when these are properly executed, the weight must for a time be balanced almost entirely on one ski. It is, however, more difficult to avoid a fall in case of an error of balance or of unexpected side-slip in the Telemark swing than in the Christiania or stemming turns, for in the two latter the unweighted foot is in a position to receive the weight and

help the balance, while in the former it can only do so in a very slight degree. Moreover, it is especially at the *finish* of the swing (when balancing is most difficult), in the Telemark, that the weight must be *entirely* on the one ski, while both the Christiania and stemming turn can, and should, be finished with the weight equally on both. If, however, the Telemark is only employed in soft snow of fair depth, the side-slip will be slight and perfectly regular, and for that reason will not disturb the balance much.

On an icy surface, or in shallow loose snow, although it is easy enough to come round with a Telemark swing, the irregular side-slip as the swing ends makes it difficult to keep the balance; but on snow of this kind, which is particularly suitable for the stemming turn or Christiania, there is no necessity to use the Telemark at all.

Practise this swing at first on a moderate slope, and then on steeper ones, until you can finally make short downhill turns on the steepest slope you can find. But do not, at any rate at first, waste time in trying to learn it where the quality of snow makes it difficult.

If at first, through nervousness or bad balance, you have much difficulty with the Telemark, you can learn it by easy stages either (1) from a

standstill, (2) from the snow-plough position, or (3) from Telemark stemming.

(1) Place yourself in the starting position of Plate XIII. Throw your weight full on to the heel of the right ski, pushing it a trifle farther outwards as you do so, and sinking into Telemark position as it slides off. If you almost simultaneously face round towards its point and bring the other ski to its side by pressing the left knee inwards, you will swing round to the left to a standstill almost before you have moved.

Or, holding yourself back with your sticks, you can place your skis in Telemark position, both pointing straight downhill. Then letting your sticks go, you can swing round instantly to a standstill.

(2) While snow-ploughing straight downhill, throw the whole weight out on to the heel of one ski, turning towards its point as you do so, and dropping the other back into Telemark position. A downhill turn, in the same way, can, as I have already said, be started by snow-ploughing and finished as a Telemark.

(3) To learn a downhill swing, traverse very slowly in Telemark position, upper ski leading, but *kneeling down on and fully weighting the lower ski*, then turn the upper ski steadily as

far round as possible into Telemark stemming position pointing downhill, immediately afterwards shifting the weight gradually forwards on to it, but *not letting the angle between the skis diminish until you are facing straight downhill*, when you can turn towards the front ski's point and bring the other round parallel.

I mention these kindergarten methods of learning the swing because I have found them really valuable for giving a nervous beginner confidence, but, if you try them, you must remember that to start the swing either from snow-ploughing or pronounced Telemark stemming is an exceedingly clumsy way of doing it, and only possible at very low speeds.

There is always a suspicion of stemming at the start of even an expert's swing, and therefore, to be quite accurate, the weight is never *entirely* on the front ski at the outset, for it is of course impossible to place the front ski at an angle with the other without using the latter as a purchase, and so weighting it slightly. But the whole essence of a good swing, which can be made, steadily and easily, at top speed, is that the preliminary stem and consequent weighting of the back ski is reduced to a minimum—is in fact imperceptible, the runner's weight coming on to

the heel of the front ski at the very outset and being practically the sole factor in the turn.

By means of this swing it is even possible to make turns in a breakable crust, if that is not very thick, and if great care is taken to hold and weight the skis correctly.

The bend of the back ski must always be in contact with the front ankle. The back knee must therefore be pressed slightly inwards even when the skis are at an angle with each other.

*Short Directions for an Uphill Telemark
Swing to the Left*

Preparatory.—With the right foot leading and weighted sink to a semi-kneeling position, the right knee perpendicularly above the foot, the left leg relaxed, the left heel raised, and the left knee almost touching the ski, both knees pressed a little inwards, the bend of the left ski level with the ankle of the right foot, and close against it.

Turn.—Turn right knee and foot inwards a little, placing front ski at slight angle with the other. *As you do so* (not later) lift outer edge of right ski and put the whole weight on right heel.

As turn begins face towards point of front ski.

Lean more and more forwards throughout turn and edge front ski harder.

At finish weight *toe* of front foot and press back knee inwards, bringing skis parallel.

Fix your eyes on the front of the right ski, and try to lean in that direction only, *not inwards*.

N.B.—A downhill turn is made in the same way, except that, to *start* the swing, the *toe* of the right foot must be weighted for a moment.

THE CHRISTIANIA SWING

A Christiania is any turn in which the *outer* ski does *not lead*, and the skis are *not* held *convergently*, i.e. the skis may be either parallel or divergent, and either held level or with the inner leading.

This swing is, according to the purpose for which it is used, and the state of the snow, either an extremely difficult or the very easiest way of turning or stopping.

It is easiest on a hard icy crust (not a breakable one) either with or without a shallow covering of loose snow, and therefore for learning it one should find snow of this sort. Most practice-grounds, trodden hard by ski-tracks, are just the thing. The gradient is not so important, for it is quite as easy to learn this swing on a steepish slope as on a moderate one. I have already shown (p. 138) how an uphill Christiania may be started from a traverse by side-slipping, and also how a stemming turn may be finished as a Christiania (p. 143). The following method is more generally useful, and a steadier way of making the swing at a high speed.

Uphill Turn to the Right.—In the normal position, run across the slope at a gentle gradient with the hill on your right, your weight on the left ski, the right ski about a foot in advance.

When fairly under weigh lean well forwards,

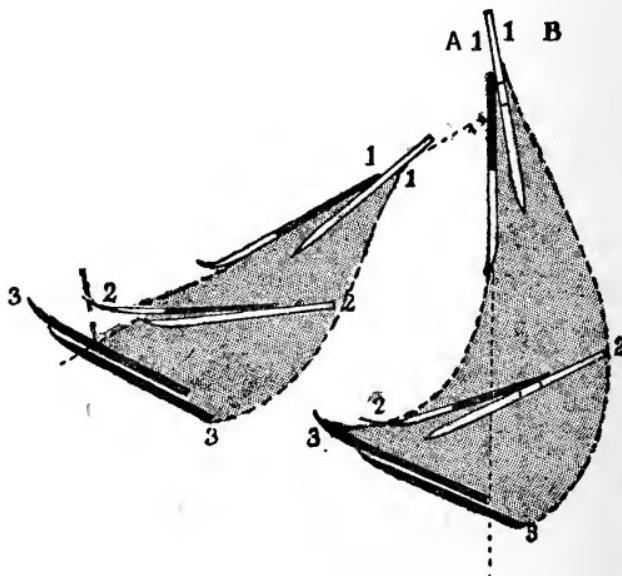


FIG. 38.—Uphill Christiania swing to right: (A from a traverse, B from a direct descent.)¹

bend the front knee, shift most of the weight from the left foot to the right *heel*, and slide the left ski about six inches farther to the rear, turning its point slightly outwards, *i.e.* down-hill, so that it takes the position shown in Fig. 38, A, 1, and at the same time flattening

¹ The blackened parts are those which should be weighted.



Track of downhill Christiania swings.—(XLII.)



Photo by

L. Büttner.

Downhill Christiania swing to right: halfway round.—(XLIII.)



"Jerked" Christiania swing to right (note position of arms and shoulders).—(XLIV.)



Downhill Telemark swing to left (seen from above).—(XLV.)



Uphill Telemark swing to right.—(XLVI.)

it by bending the left knee and ankle well outwards (Plate XXXIV.).

Owing partly to the steering effect produced by the relative position of the two skis and partly to the pressure on the heel of the right ski (a very slight momentary flattening of which will help the turn to start if it hangs fire at all), you will instantly begin to turn uphill. Immediately after beginning to turn press the left ski quickly inwards and forwards again to the normal position. As it again comes parallel to the other it may be edged and its left heel receive half the weight; *until then it must be kept flat.*

If you do all this correctly you should come to a standstill with the skis pointing more or less uphill, in the normal position, right ski leading (Fig. 38, A, 3).

The difficulty in this, as in all the turns, is, at the start, to keep most of the weight on one ski only. When, at the beginning of the swing, the weight has once been shifted on to the right ski, it must be kept there until the skis are brought parallel again. It is in order to ensure doing this that it is necessary to lean forwards, and keep the right knee well over the foot. This may appear likely to throw the weight on the toes, but the

tendency for that to happen is really less when the leg is in this position than when it is straighter. A slight lifting of the left heel will lessen the tendency to throw weight on that foot.

If much weight is put on the left foot it will be difficult to hold the skis at the narrow angle shown in the diagram, especially if the left ski has not been flattened, but is still on its inside edge. The skis, then, instead of turning together, will probably run apart in the directions in which they are pointing (Plate XXXVII.).

In this swing, as in the Telemark, the tendency of the beginner is to lean too much inwards, towards the hill. What I said in this connection when describing the Telemark swing is equally applicable here, and to save you from referring back I will repeat it.

As explained on page 82, a ski can never cut round like a skate, but slips sideways, in turning, as well as forwards; and the shallower the snow, the steeper the hill, and the higher the speed, the greater is this side-slip. In making this turn to the right, therefore, your right foot, instead of moving at once to the *right* of the line of your previous course, will at first move to the *left* of, and below it; and, if the hill is

steep or the snow shallow, may still be on its left even at the end of the swing, though the fact that the points of the skis remain on the other side of the line prevents this from being apparent at first (Fig. 38).

It is obvious, then, that if you are to remain properly balanced on your right ski, very little inward lean is necessary, and the usual directions as to leaning the body inwards while making the swing are most misleading.

In fact, although one really has to lean inwards when the turn has begun, the instinct to avoid an outward fall makes one overdo it to such an extent that at first it is better to try to throw the weight rather to the left and downhill—but *forwards*, not backwards, on to the left ski—in order to get the proper balance.

One must try to encourage the side-slip, not to check it; and the only way to do this is to try to throw the weight slightly outwards, or, at any rate, to guard against the least tendency to lean in, as one instinctively is inclined to do when the side-slip begins.

At the end of the swing the edging of the skis stops the side-slip, rather suddenly if one makes a sharp turn in soft snow, and it is only then that any conscious effort should be

made to lean inwards, *never at the beginning of the swing.*

It is useless to try to hasten the swing by turning, leaning, or swinging the body; in fact, as I have said before, if you try to turn at all you are almost certain to fall. If, however, you *try to go straight on*, simply holding the skis, and distributing the weight as I have directed, you will probably turn without difficulty.

When you can make the swing to the right, learn to make it to the left in the same way, of course substituting left for right, and right for left in the directions. When you can do this, practise it to the right again, this time running more steeply downhill than at first, and then in the same way to the left, until you can at last turn to right or left when running *straight* downhill (Fig. 38, B). But do not, at any stage, run far before beginning to swing; get fairly under weigh and make the swing, then run on and do it again, and repeat this until you get to the bottom of your practice slope. To run far between each swing only gives you more climbing in proportion to the amount of practice.

There is one thing to be noticed about making the swing when running straight downhill. When running *across* the hill the skis are edged in the

normal position, and the inner ski, which has to be slightly edged at the start of the swing, is therefore already about right. In running *straight* downhill both skis are flat in the normal position; it is therefore necessary, when turning to the right, to edge the right ski a trifle in order to begin the swing (Plate XXXV.).

The left ski is already flat; but to make sure that it keeps so as the turn begins, slightly bow the legs, turning both knees—especially the left—rather outwards.

When running straight downhill preparatory to swinging, always lead with the ski of the side to which you mean to turn.

Downhill Turn to the Right.—So far you have used the swing to make an *uphill* turn, in order to bring yourself to a standstill.

When using the swing in order to make a *downhill* turn, the skis are held in exactly the same relative positions as before, and weighted in much the same way, but it is necessary to notice carefully one or two details.

Suppose you are running across the slope with the hill on your left and wish to turn downwards to the right and make a fresh tack. Your weight in the normal running position is then on the right ski, and the left ski is advanced.

In order to start the turn it is not necessary to shift the weight, which is already on the right ski; you have merely to turn the right knee and ankle slightly outwards as before, and to put the weight on the *toe* of the right foot, at

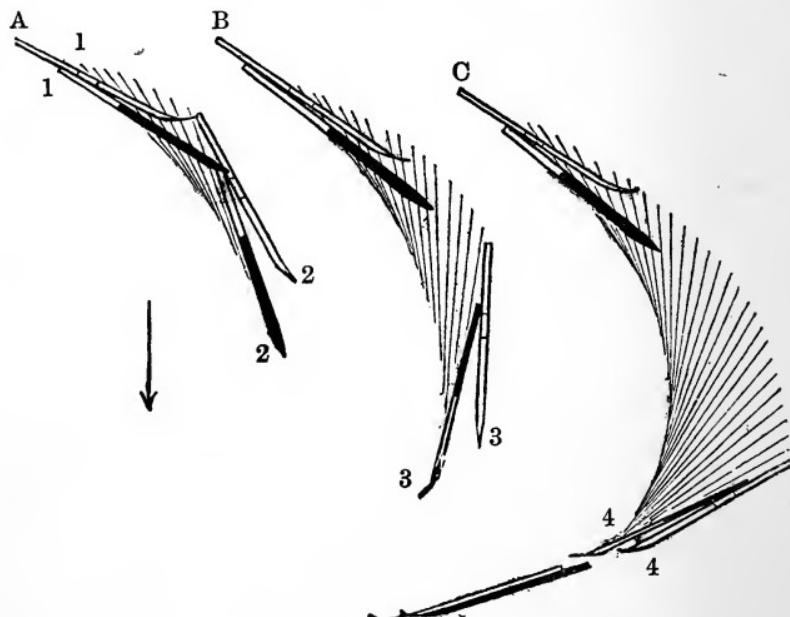


FIG. 39.—Downhill Christiania swing to the right at various stages.¹

the same time sliding the left ski to the rear. The right ski will now begin to point away from the other and turn downhill (Fig. 39, A, 1, 1). Take care to bend the right ankle only *slightly* outwards, so that the ski is not actually *edged* outwards, but only partially or completely flat-

¹ The blackened parts are those which should be weighted.

tened, according as the slope is steep or gentle; if there is any outward edging—or if the weight is on the *heel*—you will fail to start the turn.

As the right ski begins to turn downwards, take care that the angle between it and the other one does not become too wide, but that the left ski also begins to turn downhill (pressing on it with the toes and partially flattening it by bending the ankle *inwards* will enable it to do so) before the right has assumed the position of 2 in the diagram. If you put much weight on the left ski it will refuse to follow the other one round, and will either get across the heel of it, or run away from it and upset you.

The *right* knee and ankle are held in the same position throughout the swing, and this will bring the right ski on to its outside edge as soon as it is pointing directly downhill (in a sense, indeed, the right ski may be said to be “edged” throughout the swing if that expression is merely used to signify *the depression of its outer edge* and *not its relation to the surface of the snow*).

The left ankle, however, after being bent a trifle *inwards*, to start the swing, must, with the knee, be bent more and more *outwards* as the swing proceeds, in order to keep the left ski perfectly flat until it can be brought back to

the side of the other one and edged inwards as the swing ends.

As soon as you have turned so far that you are facing straight downhill, shift the weight from the toe of the right foot to the heel and finish the swing as before. If you make a downhill turn very sharply while running fast you can shift the weight from toe to heel before you are facing downhill—in fact almost immediately after the turn has begun. In trying to put the weight on the toe at the beginning of the swing, take great care not to poke the foot forward, but to keep the knee well over it, otherwise you are sure to put some weight back on the left foot.

Be on your guard also against trying to start the swing by *leaning* to the right, for, if you do this, you will either fall downhill, or will find that the right ski refuses to turn downwards. Simply lean, as before, towards the tip of the right ski, look in that direction only, and don't think of trying to turn, but rather try to go on across the slope.

As you turn downwards, of course, the pace increases, and you must therefore lean more forwards; the great thing is to keep the right knee well forward over the foot, to try to lean

over the front of the ski, and to keep your eyes on the ground at your feet, endeavouring to imagine it flat, as I advised in the case of the Telemark and stemming turns.

You will find this downhill turn of very little practical use on a steep slope until you can make it quite shortly and sharply, for, if you make a long curve, the pace increases so much in the middle of it that you are almost sure to lose control and fail to finish the swing, even if you do not fall down.

When performed in this way the Christiania swing can be used for making either up or downhill turns on practically any slope and in any kind of snow except breakable crust. The deeper, however, the skis sink into the snow, the greater is the difficulty, not only because they skid round less readily, but because it then needs more force to hold the outer, back ski at a narrow angle with the other owing to the increased outward pressure of the snow. Unless this ski is then held *perfectly flat* it will instantly run apart from the other.

In the method just described the turn is started by sliding *back* the ski which is to be the *outer* one and pointing it *away* from the side to which one is about to turn. Another

way of starting the turn is to slide *forward* the ski which is to be the *inner* one and point it *towards* the side one means to turn to. This practically amounts to the same thing looked at from another view; the relative position of the skis is exactly the same, and there is very little practical difference in the making of the turn.

As I find that beginners learn the swing more easily if told to do it in the first way, I have given these directions first, but I should have thought myself that the swing was easier to understand, and therefore to perform, when considered from this second point of view.

Before going any further let me warn the reader, if he is a beginner, that the next three pages or so are not strictly practical, but are rather meant to elucidate the theory of the swing. If after glancing at them the reader does not feel very hopeful of enlightenment, he may safely skip them.

I have so far talked about *steering* action starting the turn. When the swing is looked at from this second standpoint, one can say that *stemming* action starts it—or rather *prepares* for it.

Suppose, for instance, you are traversing to

the right at a gentle gradient, and wish to turn uphill in this way. You are in the normal position, left foot weighted, and right foot leading; in order to prepare for the turn keep the left ski edged normally and weighted, slide the right a little farther forward, turn it rather away from the other, *i.e.* point it about horizontally across the slope (the gradient of your course being very slight), and nearly flatten it by keeping the right knee and ankle a little inwards. What you are now doing is actually stemming—*divergent* stemming, not *convergent* like ordinary or Telemark stemming, but still stemming; Christiania stemming if you like to call it so. As long as you hold this position with the left ski edged and weighted and the body facing towards its point you will go straight ahead at a reduced pace. You can now stop either by stemming alone or by stemming and turning.

(1) Keep the left (running) ski normally edged, and gradually edge and weight the right stemming ski more and more until you come to a standstill without a change of front—a true stemming stop, but awkward, because the skis tend to run apart as the upper ski receives the weight.

(2) You can stop more neatly by shifting the weight *all at once* to the stemming ski, facing towards its point as you do so and instantly bringing round the lower ski—lifting it if you like, or at any rate flattening it—to the side of the upper. This is something between stopping by stemming and stopping by a step round. There is no swing about either process, and although the last may be called a turn because there is a change of front, it cannot be more than a slight one, because one cannot safely point away the upper ski at more than a slight angle.

Apart from the question of speed, with the increase of which the insecurity of any sort of stemming always increases, you cannot, of course, stop in either of these ways if traversing steeply enough for the divergent upper ski to be no longer pointing quite horizontally. You must then do so either (3) by flattening the lower ski, putting half the weight on the upper, *holding* the divergent position until the consequent steering action brings the upper ski horizontal again, and *only then* putting the whole weight on it and bringing the other parallel to it—a pure “steered” turn, with the inevitable accompanying drawback of the tendency of the skis

to run apart; or (4) by shifting the weight *all at once* to the stemming ski—*facing towards its point as you do so*, bringing the other (flattened) quickly parallel to it, and *instantly weighting the heels of both* (see p. 131), when they will turn upwards in side-slipping and come to a standstill. If before you make the turn you only point the stemming ski at a *very slight angle* away from the other, and if you throw your weight on it and face towards its point *as*, and not *after*, you point it outwards, you will, by the method just described, make what, for the sake of distinction, may be called the “steered” Christiania in the best way that it is possible to make it.

In coming to a standstill on a gentle slope from a slow traverse by any of the methods just described, you will find that the practical differences between them are very small indeed; but if running very fast you would find that the first two were impossible, and the third awkward and unsafe, but that by the last (which, as I have said, is practically the same as the method described at the beginning of the chapter) you could, if your balance were good, turn and stop with perfect ease and steadiness. What I have called Christiania

stemming, though possible, is of so little practical use that, in that respect, it is hardly worth considering; but to understand how it may be done, and its exact relation to steering, side-slipping, &c., makes it so much easier to master the difficulties of the swing, that I have risked exasperating the reader by describing it at length.

The upshot of all this is that when the Christiania is made in either of the ways so far described in this chapter, whatever steering or divergent stemming there is in it should be reduced to a minimum.

In this turn, by whatever method it is made, the main difficulty—apart from the question of balance—is in getting the turn *started*. If once the heel of the leading ski can be got fairly outside the track of its point, it is easy enough to keep the turn going. It is the *starting* of the turn that is the main object of the divergent position of the skis; in fact, although this position produces *some* steering effect as long as there is any forward motion at all, it produces less and less as the skis move more and more broadside on, and is only really efficient as the turn begins. This divergent position, indeed, although on the

whole, I think, the best possible way of starting the swing, becomes more hindrance than help as the turn proceeds, owing to the accompanying tendency, if most of the weight is on the *inner* ski, for the outer one to run away from it; or, if the *outer* ski is most weighted, for the inner one to whip round at right angles and cross the other's heel (Plate XXXIX.). You should be careful, therefore, not to let the skis point much apart, and not to let them do so *at all* for a moment longer than you can help, but as soon as you are sure the steering has done its work thoroughly, and the heel of the front ski has fairly begun to side-slip, should quickly bring the skis parallel, and carry through the rest of the turn simply by weighting both heels.

In the case of an uphill turn made while running fast, you will generally find that the skis can be brought together again almost instantly. The separation of the skis is then almost imperceptible, and no doubt many runners do it quite unconsciously. The skis merely make, as it were, a quick snip, like a pair of scissors.

In order to get the skis parallel, some people find it easier, instead of keeping the outer ski unweighted and pressing its *point inwards*

again, to shift most of the weight back and out on to it, and so thrust its *heel outwards*. The latter method puts the skis parallel a little more quickly than the former, but is apt to get them rather wide apart in doing so.

The two methods just described are, as I have said, identical in principle ; the divergent position of the skis, with its accompanying steering effect, being the main characteristic of each. In each method, moreover—apart from the question of balance—the only muscular effort necessary (which should be very slight) is that of checking and reducing the divergence of the skis ; the runner, as soon as the skis are parallel, being carried round without any effort whatever.

A third method—the one usually taught—is quite different in principle, being precisely similar to a skating turn ; that is to say, the runner uses the inertia, or rather momentum, of his upper body as a purchase from which, by a muscular effort—though not necessarily a great one—he throws both skis simultaneously more or less athwart the line of his course ; the skis remaining parallel throughout and acting practically as *one*. I said a muscular effort—I ought rather to have said “*two* muscular efforts,” for the movement which causes the skis

to turn, though it may be very slight, and may then appear to the onlooker—and even feel to the expert performer—quite simple, is really a compound one that consists of two distinct parts, and should be learnt as such.

Supposing you are running straight down-hill and want to make a turn to the right in this way, the preparation is as follows: either slightly advance the right ski, or hold both skis level, place the weight equally on both, edging them very slightly to the right, bending the knees a little, keeping both them and the skis in close contact, and leaning well forwards. These relative positions of the skis and legs are, if possible, held unaltered throughout the swing.

You can now make the double movement that produces the turn.

(1) Without letting your head turn or straightening yourself up, *swing the arms, shoulders, and upper body well round to the right.* This swinging movement should be easy yet decided, starting gently and increasing in force as it proceeds—in fact, as Mr. Richardson says, it should be made “crescendo,” not “sforzando.” It should bring you to the position of Fig. 40, A, right arm well back and left well

across the front of the body, which should be leaning more to its right than in the drawing, with the hips, therefore (to keep the centre of gravity exactly over the skis), projecting more

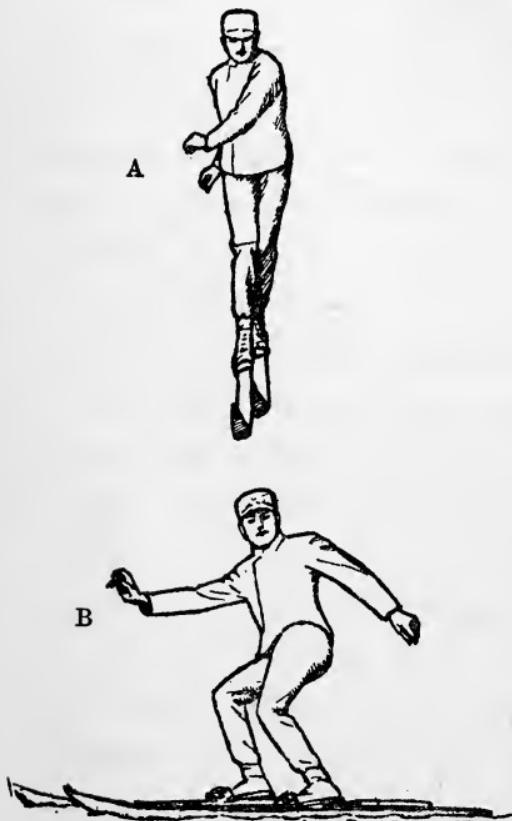


FIG. 40.—“Jerked” Christiania swing,
A before, B after turn.

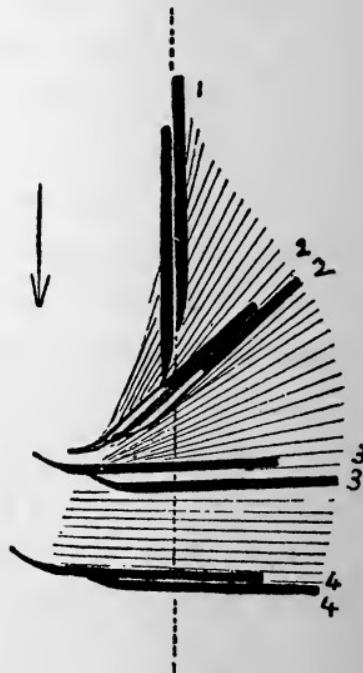


FIG. 41.

to their left. At the instant that the swinging movement of the arms and shoulders brings you into the above position—*i.e.* just before the movement reaches its extreme limit and while

its force is still increasing—make a sudden effort to reverse it—that is, simultaneously *make a vigorous stroke to the left with the arms, and jerk the hips and knees round to the right by suddenly twisting the body at the waist.*

This reverse twist of the body has practically no effect upon the shoulders—being there neutralised (though this may not be obvious at first sight) by the back-stroke of the arms—but acts almost entirely on the *hips*, turning them until they face even farther to the right than did the shoulders at the end of their previous swing. The result, therefore, of the whole double movement, if made with force and precision, should be that you find yourself in the position of Fig. 40, B, or Plate XLIV.—the skis having whipped round to right angles, or thereabouts, with their original direction—and that, after more or less side-slip, according to your speed and the quality of the snow, you come to a standstill.

In saying that this double movement should be made with force, I do not mean that it should be made *violently*. If the turn is to be made very suddenly, so that the skis whip round instantly to right angles, some force is certainly necessary, for then the *whole* of the turning

movement of the skis is carried out by the double muscular effort of the body and arms. But this double effort—the swing of the shoulders and the immediately following jerk of the hips—may be, and indeed usually *is*, used merely to *start* the turn by getting the heels of the skis outside the track of their points; the rest of the turn being carried through by the weighting of the heels, in the same way that, as I have already explained, the greater part of a steered Christiania can so be carried through. In this case the “swing-and-jerk,” which takes the place of the “snip” of the skis in the other method, may be an almost imperceptible effort, the most obvious part of which is a slight twisting of the hips. As absence of effort is of the greatest importance in ski-ing, one may perhaps say that in a sense this is the best way of making the turn. But even though you may seldom want to make the turn fully and instantaneously it is extremely useful to be able to do so in case of need, and if you have learnt to *complete* a turn forcibly you will find it all the easier to *start* one gently. If, however, you never try to do more than *start* the turn with a *gentle* swing-and-jerk, it is quite likely that you will never do even that with real certainty.

—the subtlety of a gentle movement making it more difficult to learn correctly than a forcible one. You are still more likely to be unsuccessful if you leave out half the movement, as is sometimes directed, and only try to swing the shoulders, or to twist the hips, or if you try to move both round simultaneously, or if, as I myself used wrongly to direct, you treat the double movement as two quite separate ones—a merely preparatory turn of the shoulders with a pause between it and the hip-jerk. Not that the turn *cannot* be made in either of these ways; it can in all, but only awkwardly with the help of a good deal more force than would otherwise be necessary. An expert making a “jerked” Christiania—as this sort may perhaps be called, since the jerk round of the hips and consequent thrusting forward of the ski-heels is the crucial part of it—whether he makes it powerfully or gently, will do so with just the force needed and *no more*; in other words, he will do it *gracefully*. The essential points of the movement so made are—(1) that it is a double one, (2) that the second part of the movement follows the first without the least pause, (3) that the force used, however small, is *gradually increasing* in the first part, *sudden* in the second, (4) that each part of the

movement is made with about the same strength; for feebleness in the one part has to be compensated for by undue violence in the other. If these four conditions are complied with the movement will usually need very little force.

You had better try this swing-and-jerk movement, first without skis, on a smooth floor, then with skis, but at a standstill, on the slipperiest bit of hard snow you can find—slightly convex, for choice, so that only the middles of the skis rest on it—before trying it while actually running. The first time you try it you will probably find that, in spite of the many words I have managed to use on it, it is just what you would do by the light of nature if asked, without letting your face turn, to hold your feet together and make them turn suddenly as far round to the right as possible. You will also find that in order to do it quickly you will be inclined to make the movement with a bit of a jump, and this, in fact, is the best way to do it when on skis. There should always be some dipping of the knees with the swing and the least suspicion of a spring with the jerk, just sufficient to take most of the weight off the skis for a moment and enable them to come round with less effort from the body. This

spring may, if the snow makes it difficult to start the turn, be made strongly enough to lift the skis clear of it.

This is the only turn on skis in which the arms are used as an aid to turning. In the stemming turn, the Telemark, and the other variety of the Christiania, the arms will very likely wave about involuntarily to help the balance, but as far as possible they should hang quietly by the sides, a moderately expert runner being able to make either of these turns with his hands in his pockets or clasped behind his back.

In this form of the Christiania, however, the double swing of the arms—especially their back-stroke—is the greatest help, for it practically holds the shoulders at the end of their swing, and enables the body muscles to use them as a purchase from which to pull the hips round. You can easily convince yourself of the value of free and correct arm-action in this turn if, after making it as I have directed, you try to turn either with your arms tightly folded, or clasped behind your back, or by swinging them to the right *only* and then holding them in the position of Fig. 40, A, instead of bringing them back again.

It is naturally far easiest to make a turn in this way on a hard smooth surface which allows the skis to skid round freely. It is only on this sort of snow, in fact, that the *whole* turn can be jerked; in deep soft snow it is hardly possible to do more than just *start* the turn by swing-and-jerking; the heel-weighting must then do nearly all of it. If this heel-weighting is not timed and adjusted quite nicely, or if the skis are edged at all hard before they have made a considerable change of direction, the turn is apt to miss fire altogether; it is therefore, I think, a far less useful one to the average performer than the "steered" variety, which will almost always get him round somehow, even if clumsily.

For anyone who can make both kinds perfectly, the "steered" turn involves just as little effort as the "jerked," and I certainly advise the beginner to get thoroughly accustomed to starting his turns by "steering" before he learns to "jerk" them.

I have only given directions for making the "jerked" turn from a direct descent; "jerked" turns, either uphill or downhill, can of course be made from a traverse in just the same way. Downhill turns are always rather more difficult

than uphill turns, whatever be the method of turning; downhill "jerked" turns have the added difficulty that if, as is generally the case, the angle between the two tacks is a small one, the skis have to be jerked round farther than would usually be necessary in an uphill turn, and the jerk therefore takes more effort.

In snow which allows you to make a complete jerked turn you can, if not running very fast, practically stop dead, or change your course instantaneously, by making the Christiania in this way, for the edging of the skis, after the turn has been made, stops the side-slip almost before it has had time to begin.

If, on hard snow, you make a Christiania (of any kind) sharply while travelling at a high speed, you will often find that, after you have come round, the side-slip, which will then be very great, will be too irregular to allow you to keep your balance without holding the skis at some distance apart. Even a good runner is sometimes compelled to separate his skis in this way, but you should not do it if you can possibly help it, and if compelled to, should always bring the skis together as the side-slip grows less, *not* for the look of the thing, but

because, though possible, it is difficult, if the skis are apart, to start a swing instantly in the other direction, as you may often wish to do.

The Christiania can also be started, as Bilgeri and his school advise, and as I have practically said already, from a very undeveloped ordinary stemming turn. In order, for instance, to make a swing to the left, one can advance the *right* ski, push out its heel a little, throw the weight on it, and face towards its point, and can then, by instantly bringing the left ski parallel and to the front and weighting its heel as well as the other's, finish the turn as a Christiania. This is very easy to learn, and, if the preliminary stem is reduced to a minimum, is quite effective; but it is a much less steady way of turning at a very high speed than a Christiania started with the inside ski leading, and high speed is the real test.

Having said that a "jerked" Christiania is like a skating turn, I think I had better insert the following quotation from Mr. Richardson's "Shilling Ski-runner," with the sentiment of which I heartily agree. "The beginner should remember that turns are only a means to an end, and not, as in figure skating, an end in

themselves. The real object of all ski-ing technique is to enable the runner to cross the snow as fast as possible, with as little effort as possible, and as safely as possible."

Any beginner who has followed me through this chapter on the Christiania swing will probably think that a manœuvre which takes so much description must be appallingly difficult. I can assure him that it is nothing of the sort. Indeed the expert, who does it instinctively, will no doubt wonder why on earth I have made such a fuss about it. I do not think, however, that I could have said much less and yet have given a really complete explanation of how it may be done.

The only authorities, as far as I know, who have said that there is more than one way of making the swing, are Richardson and Hoek in *Der Skilauf*; they do not explain the difference in the making of it, but only in its results, giving a diagram of the tracks of two swings, one "gerissen," and the other "gezogen," i.e. "torn" and "drawn," which, I suppose, are equivalent to "jerked" and "swung."

Some writers having given directions for one variety of the swing and some for the other; their instructions at first sight appear so extra-

ordinarily contradictory that I am almost afraid of confessing that I agree with them all, lest the reader who knows something about ski-ing should set me down as an amiable idiot. As soon, however, as one understands the cause of it, this contradictoriness is seen to be more apparent than actual. The difficulty in realising the existence of these variations of the swing is, no doubt, due to the fact that between the pure " jerked " Christiania at one end of the scale, and the pure " swung," "steered," "drawn," or whatever one likes to call it, Christiania at the other, there are an infinite number of gradations, one of them being a form of the swing that is often seen, in which the turn is started by a slight jerk *and* a slight separation of the ski-points, and is carried through by the weighting of the heels.

When one is running *across* the hill an uphill Christiania of any kind can be made with perfect ease on any sort of snow short of breakable crust; when one is running *straight downhill* it is less easy, if the snow is very loose and deep; while to make a downhill turn in deep loose snow by means of a Christiania is decidedly difficult, especially if the slope is steep, though on hard snow and a moderate slope this downhill

turn is easy enough and safer than a stemming turn, if the speed is at all high.

But although at first, when out on a run, you will be wise if you only use the Christiania for making uphill turns, and that on snow which is easy for it, you should when practising keep on trying it in deeper and deeper loose snow, and should turn downhill as well as uphill, not being satisfied until you can make fairly short downhill turns in deep loose snow on a really steep slope, as it is perfectly possible to do.

As in the case of the Telemark, the beginner can of course learn to make an uphill "steered" Christiania from a standstill by holding himself back with his sticks while he places the skis in the divergent position, and then letting himself go and swinging round immediately. This is in fact a very good way for him to begin to learn it, for he can thus find out in a very short time exactly how to hold his skis and distribute his weight; nor need he be afraid of contracting any bad habit by learning the swing in this way, for though he may find it rather easier to learn the Telemark by making it clumsily at first, he will find nothing of the sort in the case of the Christiania.

Before leaving the subject of the swings, let me

impress upon the reader that in every swing or turn the runner at first *starts* the side-slip by stemming or steering with one ski held at an angle with the other or by moving both with a jerk—in short, by a *muscular effort*, however slight a one—and that having started the side-slip he lets his weight do the rest, and is carried round without any effort at all. It is the effortless side-slipping that gives a well-made swing its characteristic feeling and appearance.

The whole difference between a novice's turn and an expert's is that in the former's the preparatory stemming or steering preponderates, in the latter's the finishing side-slip ; and that, moreover, in the novice's swing the initial and final movements are seen (and felt) to be distinct and separate, while in the expert's swing the preparatory movement merges imperceptibly into the final side-slip. The more the preparatory steering, stemming, or jerking is eliminated, the more comfortable—I will not say the easier—is the swing, and the steadier the balance if the swing is made at high speed.

In the preparatory stemming or steering the weight is for a moment more equally distributed on both skis than I have intended the beginner to suspect from the previous directions. Even in

the Telemark, in which the weight is apparently entirely on the leading ski both before and throughout the swing, it is actually, at the moment the front ski is turned inwards, half supported by the back one. The same thing happens at the moment the skis are made to diverge in starting a "steered" Christiania. But if the beginner makes any conscious effort to put the weight back—unless, indeed, he tries to keep it well forward—he will almost inevitably put it *entirely* on the back ski, and in moving it on to the leading ski as the swing proceeds will find that his balance is liable to be disturbed. The fact that the weight is always farther back than he imagines is one which the beginner must continually remind himself. In every uphill turn the weight, which is at first, as I have just said, about equally on both skis, is almost immediately moved to the *heel* of the front foot—that is, it is thrown *forward*, and as the swing finishes it is thrown still *more* forward to prevent the ski from turning too far uphill. In the directions for the swings, therefore, the beginner should remember that to weight first the heel and then the toe does *not*, as a rule, mean to throw the weight first backwards and then forwards, but to throw it first *forwards* and then *still more forwards*.

Short Directions for an Uphill Christiania Swing to the Right.—1. (“Steered”) for any kind of snow except breakable crust.

Lean forwards and put all the weight on heel of right foot, right knee rather bent and well forward over foot, right ankle bent slightly outwards, so as to lift the inner edge of right ski; left ski about 18 inches to the rear, pointed slightly away from the other, and *flat*.

This position starts the swing; as it proceeds press the left ski smartly inwards and forwards, so that it returns as soon as possible to the normal position again, parallel to and touching the right ski. As it does so, *but not before*, it may be edged and receive half the weight; unless parallel with the other, it must be *absolutely flat* and almost unweighted.

Fix your eyes on the point of the right ski and try to lean in that direction only, not inwards.

N.B.—A downhill turn is made in the same way, except that to *start* the swing the *toes* of both feet must be weighted for a moment.

2. (“Jerked”) for hard snow, or shallow loose snow.

Preparation.—Press both knees and skis together and (except before a downhill turn) edge the latter slightly to the right; weight



Jumping round to the left: bad position of skis.—(XLVII.)



Jumping round to the right.
—(XLVIII.)



Photo by

L. Büttner.

Jumping.—(XLIX.)



Photo by

L. Büttner.

Jumping.—(L.)



Jumping.—(LI.)

on both and well forwards ; knees rather bent, feet level, or the right a little ahead.

Turn.—(1) Still stooping slightly, move arms, shoulders, and upper body—not the head—well round to the right with an easy but decided swing. (2) Without the least pause simultaneously reverse the twist of the body, make a vigorous stroke to the *left* with the arms, and jerk hips and knees round to the *right*. The movement of (1) should be gradual, of (2) sudden, but the force about the same in each. The skis should whip round to right angles, or nearly so, with their previous course.

JUMPING ROUND

If you can make the stemming turn and the Telemark and Christiania swings, you will, under most ordinary conditions of snow, be able to turn or stop with ease under any circumstances. Sometimes, however, you will encounter snow, the surface of which is covered by a crust, not thick enough to bear the runner's weight without breaking, but sufficiently so to make it impossible for him to shear round through it even with a Telemark swing (for when the skis cut into a thick crust they will only run in a straight line).

Under these circumstances the only neat and quick way of turning or stopping is to do so by means of a jump which places the skis more or less broadside on to their original course, and this is not such a difficult matter as perhaps it sounds.

This jump is made with the feet level, and the skis close together and parallel, in just the same way as a jump used for starting on the side of a hill or as a substitute for the kick-turn. Pay the same attention to the points of getting the weight well on the toes before making the spring,

and of then crouching low and jumping with a free, swinging action, not a timid, jerky one, and *be sure to press the knees together.*

The skis should remain about parallel with the surface of the snow throughout the jump; if the

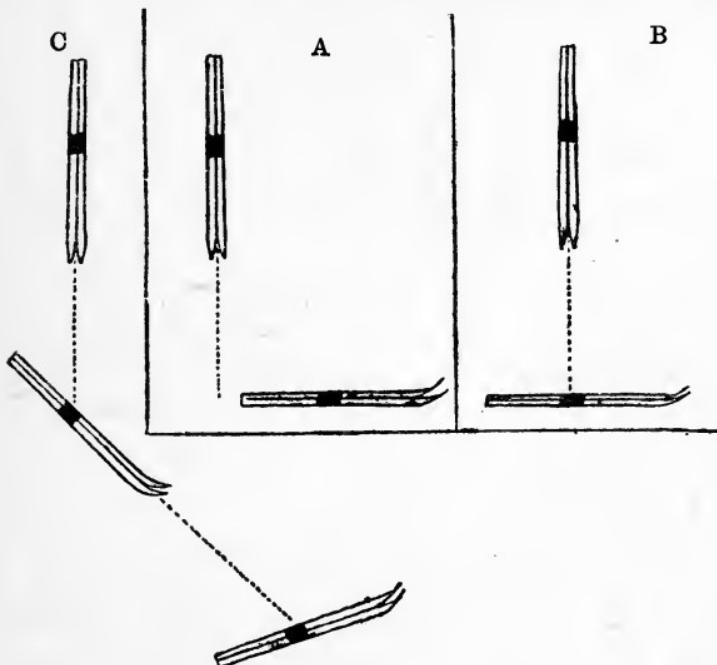


FIG. 42.

jump is used for making an uphill turn, the points of the skis must be well lifted, if for a downhill one, their heels.

You will find it far easier to keep your balance on landing, if you remember *not* to jump to *one side* of your course (Fig. 42, A), but to come to the ground with your feet as nearly as possible *on*

your original line of progress—though, of course, pointing across it, instead of along it, and, according to the speed at which you were running, more or less ahead of the place where you took off (Fig. 42, b).

The secret of using the jump round successfully lies, not in the actual making of the jump, but in knowing the safest and most effective way of applying it.

Suppose, for instance, you are running either across a slope or straight down it, at a very moderate speed, and wish to stop, you can easily do so by means of a jump round towards the hill, which will bring you almost or quite at right angles to your original course (Plates XLVII. and XLVIII.). As you land you will naturally have to lean inwards to compensate for the outward throw. The amount of inward lean necessary varies with the speed at which you are running before the jump. When the speed is at all high the inclination at which you would be safe from an outward fall is so great that on landing after the jump, if you were to make one, the skis would almost certainly skid, and you would fall inwards ; while, if the skis did happen to hold, your legs would not have enough strength to withstand the shock, but would collapse under you.



Preparing for the "Sats."—(LII.)



Making the "Sats."—(LIII.)



Hans Klopfenstein jumping (winner of inter-Swiss Championship, 1910.—(LIV.)



Landing from a Jump.—(LV.)

When running at all fast, therefore, it is impossible to stop with one jump. You must first jump a little way round, so that you face less directly downhill, and check your pace; you can then jump again and stop yourself (Fig. 42, c).

In the same way, if you wish to jump round instead of making a downhill turn, you must either make your tacks at a gradient which will keep down your speed sufficiently to allow you to make the complete turn in one jump, or you must check your pace before making the downhill jump by turning slightly uphill with a preliminary jump. This is exactly equivalent to checking the pace by making a slight uphill swing before making a downhill one.

The higher the speed, the slighter the change of direction that one can safely make in one jump, and at a very high speed it would, for this reason, be impossible to stop even in two jumps. There is nothing to prevent a runner from stopping or making a downhill turn at the highest possible speed by means of a series of jumps, but a turn so made covers so much ground that it is practically useless. This does not much matter, however, for the kind of snow which makes jumping round necessary is not such as to tempt one to run very fast.

SKATING

It is possible on a gentle slope, if the snow is shallow, to use the skis like skates, striking out with each alternately.

This needs little explanation. You have merely, while running straight downhill, to lift one ski—say, the right—and put it down again pointing outwards from the other at a widish angle, their heels being close together.

The moment the right ski touches the snow, give a vigorous push backwards and to the left with the left ski, at the same time throwing the weight of the body well forwards and to the right over the right foot. While sliding on the right ski, bring the left forward and hold it close to the other, but clear of the snow. You are then ready to make a fresh stroke by putting down the left ski and pushing with the right.

A series of such movements leaves a track as in Fig. 43, A. —

You will find it difficult at first to throw the weight sufficiently forward and outward at each stroke, especially if, instead of putting down the ski on which you are about to slide exactly

level with the other, as you should do (Fig. 43, B), you put it farther forward (c). This difficulty will cause each stroke to become shorter and shorter until it is impossible to continue the movement.

In practising, hold the ski which is off the snow parallel with and close to the other one until you are ready to make the next stroke, and slide on each foot at least far enough to make sure that your balance is perfectly steady on it.

It has already been explained how, by striking out to one side only, one can change one's direction

—for, of course, the action of stepping round is precisely the same as that of skating—and how one can in this way steer or stop oneself in breakable crust.

Skating, moreover, is one of the best possible exercises for the balance, for it teaches one to run steadily on one foot without the support

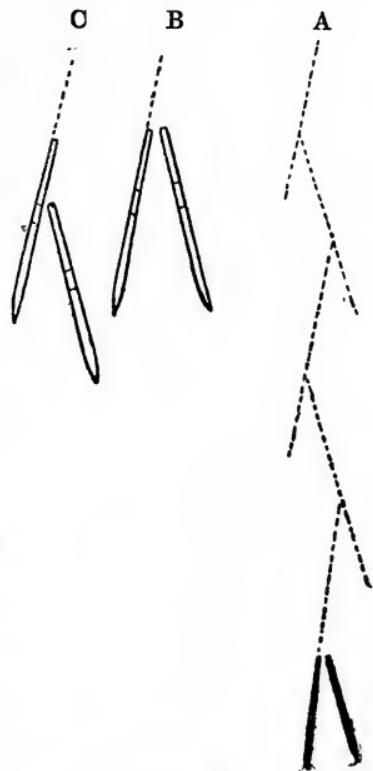


FIG. 43.

of the other, and on this account alone you should by no means omit to learn it.

It is generally supposed that by skating down a gentle slope it is possible to increase the speed, but I think this is very doubtful.

A skating track is a zigzag one, and is therefore not such a short way over a given distance as a direct slide. Then, again, although each stroke tends to increase the speed, it must be remembered that the whole weight of the runner rests on one ski, causing it to sink deeper and travel slower, and also that the skis are travelling slightly across the slope instead of straight down it, which reduces the speed still more. Besides this, the stroke itself is not directly in the line of motion, since it is impossible to place one ski at right angles with the other one.

A better way of increasing the speed downhill is probably to lunge *directly* downhill with each foot alternately, keeping the skis close together—an exactly similar action to that of moving on level ground. Pushing with the sticks will, of course, make you go faster still.

JUMPING

SKI-JUMPING no doubt arose from the discovery that a slight inequality of the surface would sometimes cause a ski-runner moving fast down-hill to leave the ground involuntarily for a moment. Some abnormal person having liked the feeling and wanted more of it, it is easy to see how his endeavour to accentuate the inequality, and so lengthen the jump, would lead him to construct a horizontal platform projecting from the hillside.

A competition jumping-hill at the present day is chosen, as to shape, and so arranged that the jumps may be as long as possible and the jumper may have a minimum of difficulty in keeping his feet on landing.

Fig. 44 shows the usual form of the hill and position of the platform. (See Frontispiece.)

The jumper starts at A and runs off the edge of the platform B into the air; landing on the slope below at C, he runs down it and out on the level, where he swings to a standstill at D.

The gradient of the hill above the platform is preferably not more than 20° or so, for the jumper

must above all things be perfectly steady as he leaves the platform, and if the upper part of the hill is very steep the sudden change of gradient as he runs on to the platform is likely to upset his balance. The impetus can therefore be obtained more safely from a long run at a moderate gradient than from a short steep one.

FIG. 44.



The steeper the slope below the platform, other things

being equal, the longer obviously will the jump be, and also the less will be the shock to the jumper as he lands, on account of the narrower angle between the ground and his course through the air. For this reason a steep gradient below the

platform is an advantage, and on big jumping-hills the angle of this part of the slope is from 25° to 35° .

The dotted line in the diagram shows how, if the platform were placed just at the point where the slope becomes steeper, the length of the jump would be greater than if, as is usually the case, the platform were built farther back; at the same time, however, the shock to the jumper on landing would be increased also, for his course through the air the moment before alighting would then be more directly downwards, and when in the air he would, at his highest point, be farther from the ground.

This is one reason why the platform is usually placed farther back. There is sometimes another reason. The gradient must remain the same for a sufficient distance below the point where the jumper lands to enable him to get a steady balance on landing, and unless the steep part of the slope is very long, it may only be possible by putting the platform farther back to ensure that the jumper shall not land too near the bottom of the hill.

For the same reason (of making things easier for the jumper) the change of angle between the top part of the hill and the platform, and also between the lower part and the

level outrun, should take place as gradually as possible.

The preceding description shows what form of hill is most desirable, and is always chosen for competition purposes where big jumps are to be made. It is by no means on a hill of this shape alone that a jump can be made; and for learning, when you will only jump a short distance, almost any hill will do, provided the ground be fairly smooth and the slope below the platform and the level outrun beyond it be long enough.

If the shape of the hill in section is convex, as in the diagram, the best place for the platform, as already explained, is at or near the point where the angle changes, *provided always that the steeper part of the hill is fully ten yards longer than the longest jump you will make*. If it is a little less than this, build the platform farther back; if much less, choose a slope where there is no change of gradient.

The slope below the platform, or, at any rate, all of it except the part which the jumper would be certain to clear, must be free from irregularities, have a good covering of snow (at least a foot *when beaten down*), and fall at a steady

gradient of not less than 20° for choice—if possible of more.

The platform itself may be built in different ways; the high platforms used in competitions are generally built of planks supported at the outer corners by posts.

This is unnecessary in the case of a low platform, such as you will use at first.

A simple way of making it, if the materials are handy, is to lay two or three planks on top of an old packing case, and then to shovel snow over them. Another way is to stand two short sticks upright in the snow at the same level, and a yard or so apart, according to the intended width of the platform. Stack fir branches against them on the uphill side, and then build a platform of snow, or alternately snow and branches, piling it high enough to rise well above the tops of the upright sticks. Beat it down with the spade and stamp it with the skis until it is quite solid.

For learning, the platform should at first be quite low—not much more than a foot high at its front edge.

For big competitions, the platform is generally 6 or 8 feet high, or even more, though

Huitfeldt, a Norwegian authority, says it should hardly exceed 3 feet.

Raising the platform, while increasing the length of the jump, also increases the shock of landing, and therefore the difficulty of the jump. This difficulty, however, depends far less on the *height* of the platform (which may, so to speak, be merely a negative quantity, for of course it is possible to make the platform *look* high by cutting away the hillside below it without affecting the nature of the jump) than upon the *difference between the angle of its surface and that of the slope below*, the most difficult kind of platform to jump from being that called by the Norwegians a "Spraet Hop" (squirt jump), which is higher at its front edge than where it joins the hillside. At first, therefore, make the platform at almost the same angle as the slope below, and join it gradually to the slope above, so that there is no sudden change of gradient.

The length of the jump depends not only on the height, position, and angle of the platform *in relation to the slope*, but also on its *absolute* angle in space. Other things being equal, a platform sloping *downwards* at an angle of between five and ten degrees permits the longest

jumps. It would be easy to find by experiment exactly the most favourable angle, and, for all I know, this may already have been done.

The platform's width, for practice, need be no more than a yard : for competitions, when the jumper may wish to take a fresh track, it is about 4 yards.

Its length of course depends on its height, and on the angle that it makes with the slope above it. Roughly speaking, for a small jump the platform would be 2 or 3 yards long ; for a big competition one at least 6 yards.

The top of the platform must, of course, be horizontal in transverse section ; take care to build it up well at the sides in order to prevent any convexity in the middle which might cause the jumper to side-slip while taking off. Carefully stamp down the snow not only on the platform, but also up the track above it for 10 or 15 yards from the platform's edge.

This stamping should leave the snow as firm and smooth as possible, but on the surface there should be just enough loose snow to give steerage way and prevent side-slip. Stamping with the *edges* of the skis on the hard trodden snow will generally loosen the surface sufficiently,

otherwise it will be necessary to sprinkle loose snow over it, or to scratch it with a rake. According to Huitfeldt, the Telemarkings pile up the snow at the edge of the platform so as to form a shallow ridge. He says that by waiting until they feel the fronts of their skis touch this, they know when to make their spring, and that it helps the forward tilt of the body which is necessary. The latter seems quite likely, but a man who timed his spring in this way when running fast would hardly even begin it before leaving the platform, far less finish making it, as he actually ought to do.

The same preparation of the track is necessary below the platform from the nearest point to it at which the jumper could possibly land to a point several yards below the longest possible jump. Pay particular attention here to stamping down the snow until it is absolutely firm, and make this trodden track a good deal wider than the platform, to avoid any possibility of the jumper landing outside it, for if the skis sink deeply into the snow on landing, a very bad fall may be the result.

After each jump snow should be thrown into



Harald Smith jumping at Adelboden, 1909 (photographed from under the platform).—(LVI.)



Jumper just clear of the platform (seen from above).—(LVI.)



How to carry the skis.—(LVIII.)



How to carry the skis.—(LIX.)
(The stick resting on the right shoulder takes some weight off the other.)

any holes made in the track by the jumper himself or his skis, and should then be stamped firm and smooth; any natural hollows likely to upset the jumper can also be filled up in the same way. If, in order to prevent side-slip, it is necessary to sprinkle the track with loose snow of a different quality to that on the track itself, it must be thrown over the whole track; for a small patch of new sticky snow, or of old and fast granular snow, would suddenly alter the runner's speed and disturb his balance.

It is better to stamp down too much of the track than too little, for a fall on hard snow is quite harmless, if the slope is steep enough, while in soft snow it may easily be dangerous. It is sometimes advisable to stamp down the whole of the outrun to where the jumper swings to a standstill.

Equipment.—Skis for jumping should be long, strong, and fairly heavy, and *must* be grooved underneath. They should be but little arched, and should not be flexible, otherwise the shock of landing after a big jump will make them bend downwards in the middle so much as to check the pace and pitch the jumper forwards.

Wax or polish their under surfaces as much as you like ; they cannot be too slippery for jumping.

Only those bindings are suitable for jumping by means of which the heel end of the ski can easily be drawn up close to the foot when that is held clear of the ground.

To carry a stick while jumping is useless, and, except for an expert on an easy jump, is exceedingly dangerous.

How to Jump.—Stand far enough up the track to get up a moderate speed, and not less than 15 yards from the edge of the platform. By no means risk running off the platform so slowly that your skis simply tip over the edge and bury their points in the snow.

Clean your skis and start off in any way you like. If the start is on the side of the hill, and not on a level place, the jumper often thrusts his sticks into the snow on each side of the track, and stands a little above them, facing straight downhill, holding himself back by resting his weight on them. He can then, by merely letting go the sticks, start quite steadily without altering the position of his skis.

Run in normal position until about 15 yards before the edge of the platform ; then bring the

feet level, and crouch down until you reach the position of Plate LII.

Take care that the *knees* as well as the feet are pressed tightly together, that the weight is well forward, and that the hands hang as low as possible, *i.e.* with the finger-tips level with the ankles. Unless you pay particular attention to this last point, and try to get as low as you possibly can, it is probable that your position, while feeling to yourself a decided crouch, will only appear to a spectator as a rather half-hearted stoop at the knees and hips.

When this low crouch has become mechanical, you had better hold your arms backwards in a horizontal position, but to touch your ankles first is the best way of making sure that your position is correct.

I believe that Norwegian authorities are not agreed as to whether the feet should be held level or in the normal position at this stage. Huitfeldt, for instance, whom I have already quoted, says that the Telemarkings, who invented jumping, always jump with the feet in the normal position. However this may be, most good jumpers take the level position, and you can safely do the same, but be sure, as you bring the feet level, that they do not get apart.

The “Sats.”—Take the above crouching position soon enough to be running steadily in it with every detail correct by the time you reach the platform, for before you reach the edge of this you must have your whole attention free to be concentrated on the actual take off, or, as the Norwegians call it, the “Sats.”

This movement, which, if timed properly, is completed at the instant that the jumper's feet come to the edge of the platform, has two objects—to increase the length of the jump, and to bring the jumper's body into a position at right angles with the slope below at the moment of landing.

The latter is the more important, for unless it is effected, the jumper is of course bound to fall.

Now, if the surface of the platform were inclined at the same angle as that part of the slope below it on which the jumper lands, he might run down to the platform and into the air without ever moving from the normal position, and though he would not increase the length of his jump, he would have every chance of keeping his feet on landing, for his body would be at the correct angle (Fig. 45, A).

But the platform itself, no matter how low it may be, and no matter how steep the slope

above it, is nearly always less steep than the slope below it, often a good deal less. This, of course, means that the jumper in making the

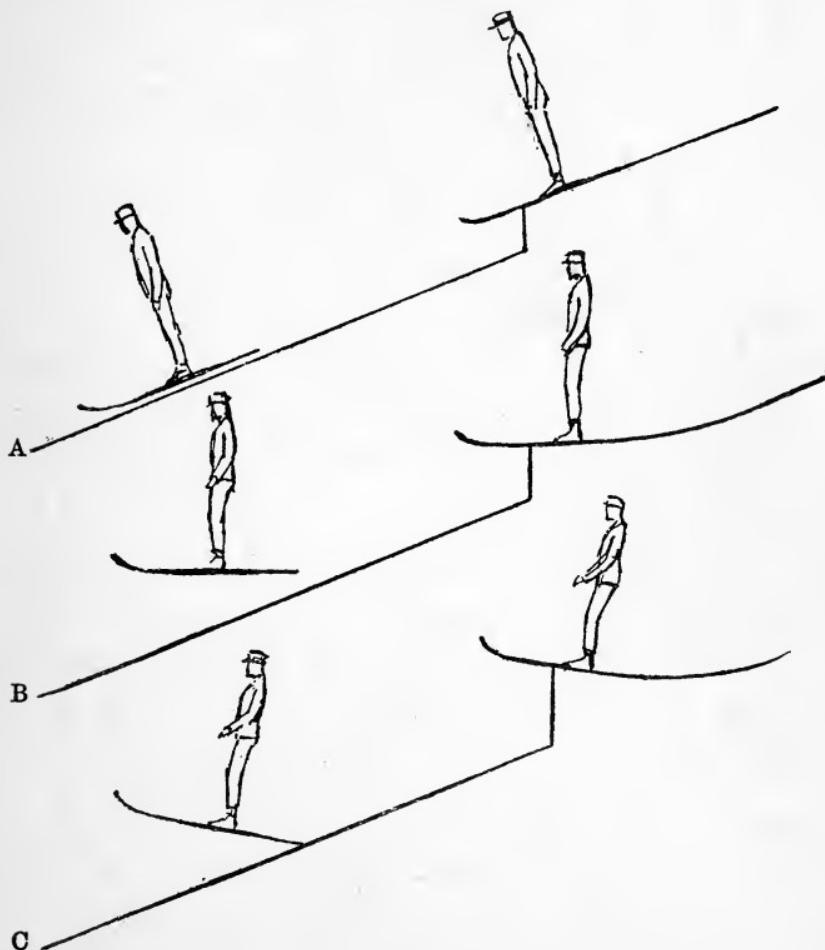


FIG. 45.

"Sats" must not only spring, but must throw his body forward, or he will land as in b and c, and fall instantly on his back.

It depends almost entirely on the angle of the jumper's body on landing as to whether he shall fall or keep his balance, and that angle depends absolutely on the way he makes the "Sats." Indeed, at the moment of leaving the platform and completing the "Sats," the jumper usually is almost certain whether he will stand or fall. It follows, then, that the correct execution of the "Sats" is the most important part of the jump. It is certainly the most difficult, and I think you will find it much easier to overcome its difficulty if you realise at the outset that the necessary forward tilt may be effected in two perfectly distinct ways.

The jumper may make the "Sats" either so that he leaves the platform tilted at exactly the angle at which he will land, or so that he is at right angles to the platform when leaving it and changes the angle of his body by degrees during his flight through the air. (See Fig. 46.)

These two methods are none the less distinct for the fact that the "Sats," as made by most jumpers, is a combination of the two.

By using the first method you will be far more certain of landing at the proper angle, but will barely increase the length of your jump; by the

second you will be able to lengthen your jump



FIG. 46.

to the utmost possible extent, but will find it

exceedingly difficult at first to regulate the forward tilt accurately.

You had better, therefore, begin by practising the first method only, and keep to that until you can jump with accuracy and certainty, when you can little by little exchange it for the second one.

In order to make the "Sats" by the first method, you have, from the crouching position of the first pair of figures, merely to bring your body and thighs into line with the legs from the knees downwards; for in the crouching position this lower part of the legs is already inclined forward at about the angle at which you will have to land.

In straightening up, therefore, be most careful to keep your legs below the knees, and also your feet, absolutely motionless.

When in the crouching position make sure that your knees are forced forwards to their utmost extent, then try to imagine that they are being held immovably in this position, and that your heels are fastened firmly down to the skis. This will ensure your making the straightening movement of the "Sats" from the knees upwards only, and, if you bring your thighs and body exactly into line with the motionless lower part

of the legs, will also ensure your landing at about the correct angle, or even slightly more forward, which will not matter.

As you straighten up, swing your arms forwards and upwards to help the movement, which, when you are used to it, you must try to make so smartly, and even violently, as to be almost instantaneous.

The sensation, however, will be quite different to that of an ordinary standing long jump, in which the heels leave the ground as the jumper crouches, and the spring is made from the toes. In this form of the "Sats" it is very important that some of the weight should remain on the heels, which should not be allowed to rise from the skis in the smallest degree. You will find that any pressure on the toes and lifting of the heels will, though it may seem unlikely, almost certainly tend to make you finish the "Sats" in an erect instead of an inclined position.

The accurate timing of the "Sats" is naturally most important. If it is made too late and the knees are still somewhat bent as the jumper leaves the platform (see Plate LIII.), the completion of the movement in the air will push the skis below their natural line of flight, and the jump will be shortened—not a very serious

matter for the beginner. If, however, the "Sats" be made too soon, and the jumper's weight comes on his skis again before they have left the platform, he will have a nasty fall forward. This need not trouble you, for you are certain to find the greatest difficulty in managing to make the "Sats" soon enough.

The more slowly you make the movement, the sooner you will have to begin it, and the more difficulty you will have in timing it accurately, but at first if you try to make it quickly you will probably not do it correctly. I strongly advise you therefore to go through the slow and careful practising stage, not on the jumping-hill at all, but without skis, in your bedroom or anywhere else. Practise this movement at any odd moment; it will soon become mechanical, and if, before you start jumping, you have learnt to make this movement quickly and accurately, you will have made things enormously easier for yourself.

When practising the "Sats" without skis you will, of course, find that, as your weight comes on your feet again at the end of the straightening movement, you will be in the act of falling forwards. You can prevent doing so by making a quick stride forward with one foot and dropping

into the Telemark position; but don't do this until the last possible moment, first making quite sure that you are perfectly straight from head to heels and inclined at a sufficient angle. See also that your feet are held quite parallel and touching each other.

So much for the first method of making the "Sats." The second is as follows. From the preparatory crouching position spring straight into the air with a free, swinging action, but as strongly as possible, at the same time giving the body a slight tilt forward, so that it becomes more and more inclined during its flight through the air. The spring is made from the toes this time, but instead of the legs being drawn up as in ordinary jumping, they should be quite straight and in line with the body as they leave the ground, and the feet should be pointed downwards, exactly parallel and close together.

This movement (the arms are swung as before) is much like that of a dive from a springboard; but while the diver's body has to make half a revolution, or pass through an angle of 180° during its flight through the air, the ski-jumper, even in the case of the most exaggerated "squirt jump" on the steepest hill, could hardly have to change his angle by more than 45° . The

ski-jumper then would seem to have the easier task.

The difficulty is that, whereas the diver wants to land (?) head first, the ski-jumper would rather not, and instinctively shrinks from the slight effort in that direction which is necessary.

The remarks in the description of the first method as to timing, &c., hold good here, and it is equally possible and advisable in this case to practise without skis. When doing so you should, after your spring into the air, land on the ground on tip-toe, tilted as much forward as possible, with your feet just where they left the ground, and absolutely parallel to and touching each other. A fall is avoided as before by dropping into the Telemark position.

When the "Sats" is made very suddenly and energetically in this way, the jumper may notice a tendency not merely to give an insufficient forward tilt to his body as he springs, but even to tilt it slightly backwards, so that he lands on his back with his skis in the air; and this in spite of the fact that he may quite have overcome his nervousness and desire to shrink back.

I think it may be worth while to explain this.

A man in making a standing jump, or a dive, raises his heels and throws his weight on his toes *as he crouches* for the spring, *i.e.* before he begins the upward movement of the spring itself. In this way his centre of gravity is brought exactly above the point from which he will push off.

A ski-jumper as he crouches for the spring keeps his foot flat on the ski and his centre of gravity over the middle of his foot, instead of over the toes. If, then, from this position he suddenly springs directly upwards, the final pressure of the toes, which are farther forward than his centre of gravity, will tend to tilt him backwards. To avoid this tendency, try, in the crouching position, to keep your weight as far forward as possible (not, however, raising the heels, which would make you too unsteady) and make your spring slightly forwards as well as upwards. When practising, without skis, either method of making the "Sats," always start the movement from the crouching position of Plate LII., and be sure that it is correct in every detail before you make the spring.

Remember that it is impossible to increase the length of a jump on skis by springing forward as you would for a standing long jump, for you

can, of course, get no purchase for the backward push. Even in the first method of making the "Sats," although the body should shoot forwards, the push of the feet is almost entirely downwards. The "Sats," in fact, when it is a jump at all, is a high jump only. Any pronounced attempt to make it a long jump will result in a fall.

Position in the Air (Plate L., &c.).—Having completed the movement of the "Sats," do not alter the position of your body and legs, but hold yourself perfectly erect during your flight through the air, your feet and skis being perfectly level (*i.e.* neither ahead of the other), close together, and exactly parallel. The skis must as soon as possible be brought parallel to the slope below you, and therefore your feet must be pointed downwards, if they are not so already, and the toes must be pressed down to prevent the heels of the skis from dropping, as they are very apt to do.

A jumper when in the air generally swings his arms round and round. Now the dog cannot wag its tail much without the tail wagging its dog a little, and as the jumper is moving freely through space his shoulder-muscles cannot swing his arms round in one direction without at the

same time swinging him—*i.e.* his body and legs as a whole—round in the other, though the movement of his body and legs will be much slower, as their mass is much greater, than that of the arms.

If, then, he is not tilted far enough forward, the jumper can, by swinging his arms in a forward-upward-backward-downward direction, make the rest of himself revolve slowly in the opposite direction on the axis of his shoulder-joints, and so tilt himself gradually forward; or, if his forward tilt is too great—which is not very likely—he can reduce it by swinging his arms round the other way.

Landing.—You should land in the above position, with the feet level, close together, and pointed well down, so that the skis strike the ground with their whole surface simultaneously, not with their heels first. Although the legs should be kept straight during most of the flight through the air, they should be bent slightly just *before* you touch the snow.

In bending them *be sure to press the knees together*, for to do so will ensure that, on landing, the skis are level, close together, and parallel; and also, which is equally important, that they strike the snow flat, and not edged slightly

outwards, as they are apt to do if the feet only are held together.

This bringing together of the knees is therefore the greatest help to landing steadily, and if you remember to do it you need not think about bending the legs, for when his knees are touching and his feet parallel it is impossible for a man of normal build to keep his legs straight. I strongly advise you to include this movement in your practice of the "Sats" (2nd method) without skis.

As you feel the ground, *but not before*, drop smartly into Telemark position, with the weight well forward. This helps to diminish the shock, and also, of course, the chance of a fall backwards or forwards. It is such a help to the balance that when you have got into the habit of it, you will be inclined to begin the forward stride in the air. Be careful to avoid doing so, for, if you do, you may strike the snow with one ski sooner than with the other, which will very likely upset you. There is the same danger if you land with your skis apart instead of close together.

As the skis strike the snow, they bend in the middle and each makes a depression in the snow. From the deepest part of the hindmost

of these depressions to the edge of the platform is the measure of the jump. The record stands at present at 47 metres (154 feet); you will do well if you jump a tenth of this distance without falling by the end of your first day's practice.

As you drop into the Telemark position, keep the ankles and knees well inwards and let the pressure be rather on the inside of the foot, or your skis may run apart and upset you.

Only run in Telemark position until you are certain that you have your balance. You should, if possible, make a merely momentary dip and then straighten up smartly and finish your run in the normal position, stopping yourself on the level by a swing or a jump round as soon as you can.

GENERAL HINTS

Ski-jumping to the ordinarily constituted person who tries it for the first time is extremely alarming. Although when the whole of the hillside is of the same steepness he may from the starting-point see something of the lower part of the slope, the exact spot on which he will land is nearly always hidden from the jumper until just before he reaches the edge of the platform, and even from that point it is still

invisible if the platform is built back from the edge of a steep slope. When the lower part of the jumping-hill is steeper than the upper, as it nearly always is, the platform, seen from above, appears to be projecting over the edge of a cliff.

This at first gives all but exceptionally bold spirits an irresistible desire to shrink back on approaching it, and it usually takes one some time to overcome this desire, even after realising that there is practically no danger at all. Even when the jumper feels no fear his natural disinclination to make his spring until he can see where he is going to land will for some time tend to make him defer the "Sats" until too late.

The instinct to shrink back is, at any rate at first, the principal difficulty in ski-jumping, and I think you will find that the best way to overcome it is, in a sense, to give way to it—that is, to start under conditions which are as little alarming as possible and to increase the difficulty by very slow degrees.

Begin by making very short jumps on a quite moderate slope, no steeper below than above the platform, which must be quite low and long.

The fact of the slope being a gentle one does

actually add to the difficulty of standing, but only to a very slight extent if the platform is quite low; and this form of hill is so much the least alarming, that I advise you to choose it for your first attempts.

Then make the same kind of jump on a fairly steep slope.

Then build your platform, still quite low, rather back from the edge of as steep a slope as you can find, the slope above it being a moderate one. Begin here with quite small jumps, and gradually start farther and farther back until you can make, with fair certainty of standing, as long a jump as the form of the hill and platform will permit; taking care, of course, that the lower slope is of ample length, *and that there is no sudden change of angle where it joins the level*, for this causes really bad falls.

After this you can make things more difficult for yourself in various ways, such as increasing the height of the platform, or building it at the very edge of a steep slope instead of rather back from it, or making it point upwards so as to form a "squirt jump."

"A squirt jump" on a moderate slope is excellent practice. The considerable difference in

angle between the platform and the alighting ground makes it necessary for the learner to throw himself well forward in making the "Sats," and the fact that he drops from a good height on to comparatively flat ground makes the shock sufficient to compel him to bend his knees and take the Telemark position on landing. Only jumps of a few yards should be made in this way, however. The shock is too great for safety if the drop is a really long one.

On no account allow yourself to forsake easy hills for more difficult ones until on the former you can make your jumps *in perfect style, correct to the smallest detail.*

It is only by acquiring an absolutely perfect style that you can make anything but the smallest and easiest jumps with any certainty of standing, and for this reason the only way to gain confidence is to improve your style.

It may be a fine moral discipline to force yourself over jumps of an alarming size from the very first, but it will not make you a better jumper; for if you are very nervous you will be able to think of nothing until the jump is finished, and so will learn nothing and have no better prospect of standing at the twentieth jump than at the first.

After a course of this it is not unlikely that the last state of your nerve will be worse than the first.

It is a good thing to jump occasionally on big hills almost from the first if you can do so without feeling very nervous, but do not give up small jumps until your style is perfect, otherwise it never will be.

In Norway the style of the jump is considered as important as, if not more so than, its length. At a competition a jumper receives marks according to the manner in which he performs each stage of the jump—the approach, the "Sats," the flight through the air, the landing, the rest of the run, and the swing at the finish. Under certain circumstances even a fall is not considered greatly to a jumper's discredit. If, for instance, a man makes a jump in good style and is evidently steady on landing, but, after running a few yards, loses his balance on a bad bit of ground, he may score higher than a man who jumps rather farther and finishes without falling, but does so in very bad style. I do not mean to say that merely dribbling over the edge in a graceful attitude is encouraged, for to jump as hard as possible is part of good style, and to receive any considera-

tion a jump must, as to length, be within reasonable distance of the maximum allowed by the form of the hill and platform.

Those who jump farthest, however, almost invariably jump in the best style, and a very long standing jump in really bad style is sure to be a fluke; so that in rewarding the most accurate jumpers the Norwegians probably reward those who in the aggregate have jumped the greatest distances, whatever their performance on any single occasion may be.

I agree, however, with Mr. Richardson in thinking that this system is likely to lead to too much stress being laid on the purely ornamental side of style, and that on the whole it would be much better to consider only the length of the jump and whether the jumper stands or falls on landing. Always bearing in mind, then, that it is only a means to the end of jumping as far and of landing as steadily as possible, do your utmost to improve your style, watch for faults, and get other people to criticise you as well. Check at the outset any tendency to acquire any of the following bad habits:—

In the crouching position before the “Sats”:

Separating your feet or knees; only bending slightly, instead of crouching quite low.

In the "Sats":

Making a feeble, timid effort, and not straightening out completely, instead of springing smartly and vigorously to an erect position, with body and legs in a perfectly straight line.

In the air:

Bending at the hips or knees; separating the skis, not keeping them parallel and in the same plane; letting their heels drop; not keeping the feet level; not bringing the knees together before landing.

Landing:

Landing with the skis apart, or edged outwards, or not parallel, or with one more ahead than the other; letting their heels touch the snow first; landing with straight legs (or very bent ones); not dropping into Telemark position.

There is a method of jumping known in Norway as the "traekke op," in which, during the flight through the air, the feet are drawn up as close as possible to the body, which is bent forward. This diminishes the resistance of the air and perhaps slightly increases the length of the jump, but is considerably more difficult than the upright method, because it has a greater tendency to make the jumper land leaning backwards, or with the knees and feet

separated so that the skis are pointed apart, or with the legs so much bent that they are liable to collapse from the shock.

In Norway this method is generally considered less good style than the other.

If you wish to try it you had better make the "Sats" in the ordinary way, straightening out completely before you begin to draw up the legs, and almost completely again before landing. Be sure also, in lifting the feet, to raise the toes well in order to avoid any risk of plunging the points of your skis into the snow on landing.

It is very good practice for the balance to make jumps in this way when you cross small undulations in the course of a run, or even when the ground is quite smooth. You will then, of course, have to draw up your feet the moment you leave the ground. Be careful, by holding your *knees* together, to keep your skis from pointing outwards as you land.

An expert when running fast can in this way jump a low fence or, to be precise, an obstacle 2 feet or so high.

In spite of all that I have said about the necessity for taking it gradually, and keeping off big hills at first, you need not be afraid

of hurting yourself much, no matter how far you may jump, provided the hill and platform be properly arranged, for in that case an accident is almost impossible. You are far more likely to meet with one when running at a comparatively low speed on tour, if the snow is soft and deep.

To be able to jump even moderately well will enormously improve your running generally, and will give you a confidence and dash that can hardly be acquired in any other way.

It is an excellent plan for the beginner to practise all the motions of jumping while running down a slope, without any platform, and at first without even a change of gradient. Make a mark on the ground ; run towards it, crouching ; make the "Sats" as you reach it, springing into the air if possible ; drop into Telemark position, and straighten up again. Practise this until on a slope where there is a slight change of gradient you can make a jump of 3 or 4 yards steadily, and you will find things come much easier when you try from a platform.

Finally, let me remind you of the childish plan that I have already advocated, of pretending that you want to go faster than you are actually moving. You can now pretend

that you want to stay in the air as long as possible—unless you really want to, which is unlikely at first.

The man who wants to make a long jump is much more likely to stand than the one who merely wants not to fall.

Short Directions for the Jump.—Run in normal position until within about 15 yards of the platform's edge (not so close if running very fast), then bring your feet level and, *keeping your knees pressed together* and well forwards, crouch down as low as possible. When the hands can touch the ankles draw them right back.

Just before reaching the edge of the platform make the “Sats” by either of the following methods:—

1. Without raising the heels or moving the feet or legs below the knees, swing your arms forward and upward and straighten yourself smartly until your body and thighs are in a line with the lower part of the legs. You will then, if you have moved from the knees only, be leaning well forward.

2. Swinging the arms as before, spring vigorously almost straight upwards from the platform, giving the body a slight forward

tilting motion as you do so, and straightening out completely from head to foot, but this time raising the heels and finishing the spring from the toes.

On completing the "Sats," hold the erect position during the flight through the air, keeping the feet level and close together and the skis parallel to each other and to the slope below.

Just before landing press the knees together, and, as you feel your skis touch the snow, but not until then, drop into Telemark position.

The moment you feel steady straighten up again, finish your run in the normal position, and swing or jump round.

HOW TO RUN ACROSS COUNTRY

As soon as you have acquired a moderate proficiency in the various manœuvres that have been described, you should have little difficulty in getting through a run quickly and comfortably without feeling any temptation to use your stick when once the descent has begun.

The following hints may help you when you go for an expedition :—

In the first place, be sure, especially if you are going far, that you are taking everything you can possibly want—spare clothing, food, dark glasses, wax and rag, knife, sealskin, climbing-irons, repair outfit, map, compass, lantern, matches, &c., if you decide that any or all of these things are necessary.

If the first part of the climb is along a beaten path, it will probably save time to cover that on foot. You can then either drag the skis after you by a string tied to the holes in their tips, or can carry them. Most people eventually prefer the latter method.

The best way of carrying the skis is to place them sole to sole (tie them so if you like), and then either to rest them almost *horizontally* on the shoulder, points forward, and hold them near the bend, or to lean them nearly *upright* against the shoulder, points up, and, with the arm hanging almost straight, to hold them by the heel ends (Plates LVIII. and LIX.).

They can also be carried by a sling from the shoulder, a convenient plan if any scrambling is to be done.

If you are climbing the hill by the route that you mean to follow during the run down, you should take every opportunity of making observations which will be useful to you later on, and will enable you to make the descent as quickly and easily as possible.

Try to plan out exactly how you will take the run down.

Notice all the peculiarities of the ground and snow, and fix in your head the principal landmarks. But remember that the ground will look very different when approached from above, and therefore keep on looking backwards at what you have passed.

Pay particular attention to the points where the angle of the slope changes, in order that

when from above you are running towards an invisible piece of steeper ground, you may have the clearest possible idea of what to expect.

The actual climbing will at first give you a good deal to think of.

The ordinary procedure, when several skirunners are climbing a hill, is for one to lead and the rest to walk in his track in single file.

If the snow is soft and deep the leader's work may be very exhausting, and each of the party will have to take his turn.

If you are leading, make your tacks as long as possible to avoid wasting time in kick-turns. Remember all that has been said about adjusting your course to the contour of the hill so that you mount at a steady gradient which is too steep for no one in the party, about not side-stepping unnecessarily, and so on. And never, without good reason, attempt to hurry.

If you are not leading, and if the leader is a competent person, you will not have much to think of. If he is not, you may find following him a tiresome business.

If it is really difficult to do so (not merely irritating), don't dream of suffering in silence, but complain at once, and if he is so stupid or

inconsiderate as to persist in his misdeeds, make a new track for yourself.

Don't be at all disturbed if you find yourself being left behind, but keep on steadily at your own pace.

If you make a halt and take your skis off, clean them thoroughly at once, and see that their soles are neither wet nor warm when you put them on again. If you are likely to feel cold (and you *are* likely as a rule), put on spare clothing as soon as you stop, not after you feel chilly.

Wax your skis thoroughly before starting the run down if the snow is sticky, or is likely to be so lower down; and remember to button up your pockets, or you may find at the bottom of the hill that snow has either taken the place of, or ruined their contents.

I have so far attempted no description of the snow itself. It varies infinitely in consistency, but considerably less so in appearance, and for this reason it is often impossible for the runner to be sure of the quality of the snow in front of him until his skis actually touch it.

This latter fact adds considerably to the difficulty of ski-running when patches of different slipperiness occur at short intervals. The worst

kind of patchy snow consists of a hard and slippery ice-crust in the hollows of which finely powdered wind-blown snow has accumulated; fortunately in this case the difference is generally visible, the slow powdery snow being perfectly white and the ice-crust rather greyer. The safest way of negotiating snow of this sort while running straight has already been explained.

For practical purposes the ski-runner may consider the snow to be of three distinct varieties according to the consistency of its surface: viz. soft snow, hard snow, and breakable crust. There is no real division between these varieties, each melting into the other by imperceptible gradations; but, where the quality of the snow falls clearly under one of these headings, the runner will be obliged to use certain definite methods of turning and stopping, unless he is either a thorough expert, or a stick-rider of the worst kind. For, as I have already said, the former can make any kind of swing in almost any kind of snow, while the latter has only one method of turning, viz. that of dragging himself to one side or the other by means of his stick, carefully preserving while he does so his normal running position, with

the knees well bent and the skis level, parallel, and a yard or so apart, which manœuvre he calls making a stemming curve or a Christiania swing, according as the turn has been a downhill or an uphill one.

Assuming, then, that you belong to neither of these classes, you will have to know how to adapt the means of turning to the quality of the snow. It should be fairly obvious from the descriptions of the different swings how this is to be done.

In *deep* loose snow make all your turns, whether downhill or uphill, by means of the Telemark swing.

On hard snow, whether quite bare or covered by a very shallow layer of loose snow, make your downhill curves by means of the stemming turn, and use the Christiania swing for turning uphill.

In breakable crust, if it is very thin, you may find it possible to turn or stop with the Telemark. If this is out of the question you will have to jump or step round.

Of course soft snow may be so dense that the ski sinks into it but little (as in the case of watery spring snow); you will find it just as easy to make stemming turns and Christi-

anias in this as to make Telemarks—perhaps even easier.

In the same way the layer of loose snow on a crust may be deep enough to allow Telemarks to be made as steadily as the other turns.

A breakable crust, too, may be so thin as to be hardly perceptible, or so thick that only some extra pressure (which occurs when a swing is made) will make it give way; but, generally speaking, you will find that you are limited to one method or the other—if you want to run with the maximum of steadiness.

Evidently, then, the Telemark is at least as generally useful as the other two turns to the moderately skilful runner who does not rely on the help of his stick. Yet most English runners undoubtedly look upon it as a pretty trick of no practical value, and never attempt it during a run.

It is quite certain, however, that a man who can make a Telemark swing with fair steadiness on a hard and slippery practice-ground (and the average runner can do this) will find it far easier to do so in the soft loose snow which is, fortunately, the variety most commonly met with during a run.

And if he can make the swing to the left, he is certainly capable of learning to make it

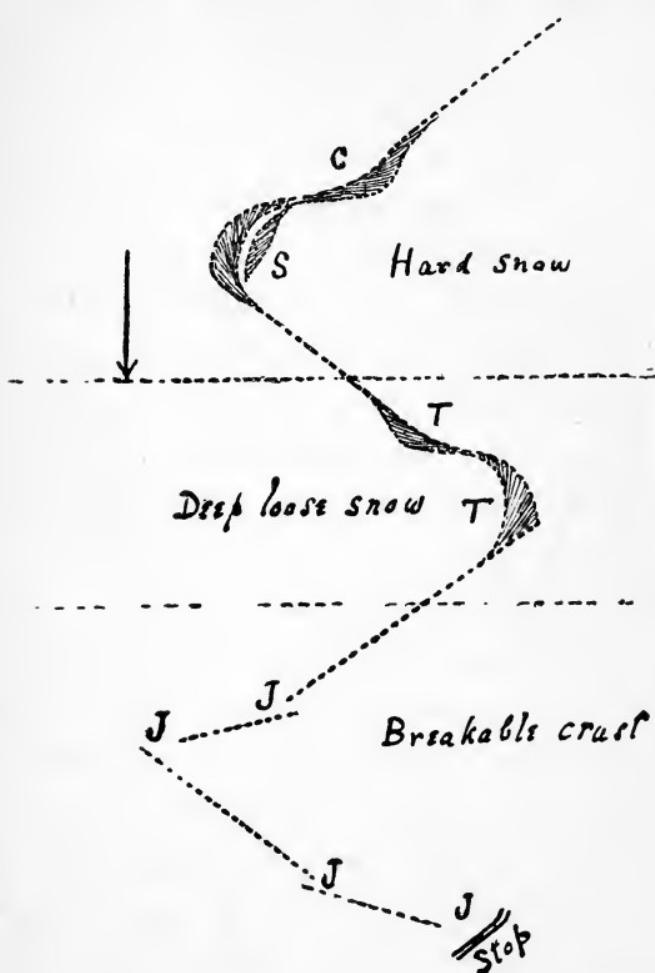


FIG. 47.—S, Stemming Turn; T, Telemark; C, Christiania; J, Jump round.

to the right, and of turning downhill with it as well as uphill.

But if the runner only learns the Telemark

to the left and the Christiania to the right, as most people are content to do, it will be a long time before he can rely on them during a run; for only the thorough expert can make both these swings with steadiness and certainty in any kind of snow, especially if his speed be high or the slope steep.

With the Christiania in particular it is exceedingly difficult, if the snow is unsuitable, to make a downhill turn, and by no means easy to make an uphill one.

The stemming turn, which is the only one attempted during a run by the average runner (I say "attempted" advisedly, for an examination of his track will seldom reveal much trace of actual stemming), is even more difficult to make in unsuitable snow than the Christiania.

The most important thing for you to remember when you first begin to make practical use of the swings, &c., while on a run, is that if you wish to fall as little as possible, you should *never attempt to turn or stop while running at all fast.*

If you run with judgment you can always avoid having to do this.

Suppose, for instance, that you find yourself approaching the edge of a steep slope; if your

course is clear and the slope has an easy outrun on to level or nearly level ground, by all means run straight down; for at the bottom you will either run to a standstill or will slow up enough to be able to turn easily if necessary.

If, however, there is no clear outrun at the bottom of the slope, or if there are obstacles in your path, don't dream of dashing straight over the edge and trying to turn off lower down, which you will certainly fail to do, but either stem, snow-plough, or side-slip straight down the slope, or turn off at once and take it in zigzags, making a downhill turn at the end of each tack by whatever method the quality of the snow demands. And unless you run each tack at a very gentle gradient indeed, you should take the further precaution of slowing up by turning slightly uphill before beginning each downhill turn.

To check the pace by making an uphill swing is a much neater and easier way of doing it than by stemming with the lower foot; the latter is a process which, when the ground is open, you need seldom use if you have a moderate command of the swings, though among obstacles—in dense wood and the like—you may often find it necessary to have recourse to it.

The means you use for making this preliminary uphill turn will depend, of course, on the quality of the snow, just as in the case of the downhill one.

Fig. 47 shows what turns to use in order to run in zigzags through snow of the three different qualities. The downhill turns should be made as shortly and sharply as possible, in order to prevent the pace from becoming unmanageable in the middle of them.

If on account of the nature of the ground you decide to run straight down a steep slope instead of taking it in zigzags, you must, of course, be ready to drop into Telemark position for any sudden undulations or difficult snow.

Remember that the quality of the snow depends to a great extent on the direction in which the slope faces.

On slopes with a north aspect, especially if they are steep, the snow gets little or no sun, and is generally soft and easy, though even here it may sometimes get crusted by very strong winds or by frost after a warm wind or rain.

On slopes which face south the snow is exposed to the rays of the sun — more or less directly according to the steepness of the slope

and the time of year. During the day, therefore, the surface of the snow melts, freezing at night into a crust, and when the sun goes off these south slopes they are, as a rule, perfectly hard and icy, though when the sun is full on them they may become so soft that you will find it difficult to use any turn except the Telemark.

The most difficult snow occurs on slopes which face a little south of east or west, and on due south slopes when the sun is just beginning to strike them, or is going off them; for then the hard crust generally becomes more or less breakable.

If you get these facts about the snow well into your head, it will be a great help to you during a run.

You will very likely find that one kind of turn comes easier than another, and at first, when your principal object is to run steadily and avoid falls as far as you can, your safest plan will be to shape your course so as to make most of your turns by the method that you find easiest. If you thoroughly understand the conditions which affect the quality of the snow, you will know where to look for that kind of snow which suits your favourite method of turn-

ing, and what places to avoid for the probable unsuitability of their surface.

Do not forget that what is true of the main slopes is also true of their minor features. On slopes facing east or west, for instance, each small undulation has its north and south side, the surface of which is affected by sun and frost in just the same way as the main slopes facing in that direction. If you remember this you will often, when running across a slope whose general surface is difficult, be able to find small patches of snow on the sides of the undulations in which you can turn quite easily.

When beginning the run down always make up your mind before you start how you mean to negotiate that part of the hill which is visible. If some way ahead the ground becomes steeper, so as to be invisible, and you do not know what it is like, don't run at a high speed to where the slope changes, but approach it in zigzags, or at any rate slowly, in case you should find it necessary to turn off or stop at the edge of the steeper slope. By doing this you will preclude the possibility of dropping over a precipice on unknown ground.

As soon as you can see what was hidden from you, plan out, without stopping if possible, the

next visible piece of your course in the same way.

There is one difficulty about steering among obstacles which it may be as well to mention.

Suppose you are running down or across a slope with a tree straight ahead of you which you mean to avoid when fairly close to it, by swinging, say, to the left.

As you already know, you must, at the beginning of any turn, lean forwards, perhaps even a little outwards, *never* inwards. Now, if there were no tree in front of you, you would probably have no difficulty whatever in making the turn, but the fear of running into the tree will at first be almost certain to make you lean away from it as you begin the turn—that is, backwards and to the left. You will then, if you don't fall down at once, at any rate fail to turn sharply, and so will probably do exactly what you were trying to avoid, viz. run into the tree.

Apropos of trees, let me remind you that turns are mainly for *steering*, and that therefore, except just at first, they should be practised *where steering is necessary*—i.e. among trees or other obstacles. Unless you take every opportunity of practising them there, they will be of little real use to you.

You should soon be able to make downhill turns on any *open* slope with ease, and will soon afterwards cease to find much fun in doing so, but there is no end to the difficulty and therefore the interest of turning quickly among obstacles, and anyone who is or wishes to be a good ski-er will not be happy unless he gets plenty of wood-running. Nor, for much the same reasons, will he be contented without plenty of *bad and difficult snow*, a fact which you should lay to heart at the outset.

I have already said that when running fast on ground that is covered with hard ski-tracks, you should try to avoid crossing them at a narrow angle. You will sometimes find that you want to run a traverse on a slope closely covered with hard parallel tracks, leading exactly the way you want to go and steeply enough to make running *in* them extremely unsteady. Your best plan here is to run almost or quite directly downhill across them for a short distance, and then to turn upwards with a Christiania and make a longish traverse at a less steep angle than the tracks; your low speed then enabling you to cross them at a narrow angle in safety. By repeating this process you will reach the point to which the tracks lead almost as quickly and

far more comfortably than by following them. To make alternate direct descents and gradual traverses in this way is also convenient when you would otherwise have to run a steep *stemming* traverse.

By paying careful attention to all the above points you should soon be able to run safely and steadily, and to get down any ordinary hill with few or no falls. This also means that you will accomplish the descent in pretty quick time, provided that you *never stop* if you can possibly help it, and that after a fall you get up without either hurrying or dawdling.

This kind of running makes no great demands on your skill, and still less on your nerve. Its main object is the avoidance of falls, and *at first this should certainly be your sole aim*. But if you wish to become a really good runner you should not allow it to remain so for long.

The first-rate runner has absolute command of the various swings, &c., and can stop suddenly or dodge among obstacles at a pretty high speed with perfect steadiness (at very high speeds it is impossible to turn or stop *suddenly*; the curve of the swing is then bound to be more or less long and gradual). He never turns or stops if he can help it, however, but runs everything *as*

straight as he can, and at the highest possible speed.

There is not the least doubt that to take a hill in this way not only demands the utmost skill, but gives the greatest pleasure that ski-running, pure and simple, can afford.

It is not unusual to hear a man who never takes the easiest slope without constant zigzagging, say that he does so because he *prefers* going slowly and spinning out the run to dashing down in a quarter of the time. He infers, if he does not actually say, that the fear of speed has nothing to do with his choice.

You may be nearly sure that the man who talks in this way is inferring, if not telling, a lie, though very likely unconsciously. I used to say the same myself, and did not realise for some time that every ski-runner, whatever he may say or think, runs just as fast as he dares.

I don't for a moment mean to say that there is anything to be ashamed of in being afraid of going fast. Indeed, the man who realises and openly admits that he is afraid, and who refuses to attempt anything which puts a great strain on his nerve, is very likely a more reasonable and admirable person than the one who

gradually becomes a better runner simply through being ashamed of admitting his cowardice even to himself. I only want to impress upon you that the *sine qua non* of fine ski-running is *speed*, and that if you want to become a fine runner, you must be always trying to take things faster and faster. One reason why jumping is such an excellent training for the ski-runner is that it accustoms him to running at the greatest possible speed, and to falling occasionally while doing so.

To pay no particular attention to anything but straight running and speed from the first is of course absurd, for if you do this you will fall about hopelessly when any steering is necessary, and the most miserable stick-riding zig-zagger will be down a hill long before you.

First of all, practise all the turns until you can make them with steadiness, for the special purposes and on the particular snow to which they are best adapted.

If you are weak in any turn, practise that one especially, *not only on the practice-ground, but during a run.*

To do the latter will, of course, add considerably to the number of your falls during a run, but it is the only way to improve, and you

should never, except at the very outset, or for some special reason, be too anxious not to fall.

The boast of having accomplished a run without a single fall is usually sufficient to stamp the utterer of it as either a novice or a nervous person, who has negotiated his whole run in the easiest possible way. A very moderate runner, if he chooses, can thus avoid falling easily enough; but if he wishes to become a better one, he is bound to take chances, where an unambitious or timid one would play for safety.

Do not forget, however, that if to boast of *not* falling lays you open to suspicion in one way, to boast of *falling* stamps you infallibly in another.

After you can make all the turns pretty well in the snow which is easiest for each, begin to practise them in difficult snow. When you can make them while running at a moderate speed, try to do so at higher and higher speeds.

You can then practise running with the same foot leading the whole time, and make only Telemarks one way and Christianias the other; if you find this easier with the right foot leading, run always with the left foot leading until that comes just as easy.

Do your utmost, in short, to improve your

steering in every possible way, and then try to run everything as straight and fast as ever you can.

I don't, of course, mean that you are to become a past master at swinging and turning before you try to run straight and fast, for the two things can be practised together. But steering must come first, and until you can steer as well with your long grooved ski and without the help of the stick as the most redoubtable Lilienfeld stick-rider with his short smooth skis, you must give much more attention to that than to speed.

Your ultimate aim must, as I have already said, be to run in the utmost safety, with the utmost skill (*i.e.* with the least effort) and at the utmost speed; but if ever, as in a race, speed is almost your sole object, remember the following facts :—

Apart from the question of obstacles, the quickest way to get down a hill is of course to run *freely* straight down it.

The *second* quickest way is a *free* direct descent checked at intervals by uphill swings, so that the speed never becomes high enough to be difficult.

The *third* quickest way is a direct *stemming* (Telemark, snow-plough, or side-slip) descent, and

not, as most people imagine, a *free* descent by tacks and downhill turns. The latter method takes more skill and less effort, but is a great deal slower.

To sum up, let me advise you to take in succession each of the following series of "Don'ts" as your guiding maxim when learning cross-country running :—

- (1) *Don't fall* (but stem, kick-turn, and stop *ad lib.*).
- (2) *Don't stop* (*i.e.* stem *ad lib.*, but make no kick-turns).
- (3) *Don't stem* (but make as gradual tacks as you like, and check the pace when necessary by uphill swings).
- (4) *Don't slow up before turning downhill.*
- (5) *Don't*—if you can safely avoid it—*turn at all.*

When you can accomplish a run without *falling* or *stopping*, you may consider yourself a third-rate cross-country runner, being quite safe and not too slow.

When you can do so without *falling*, *stopping*, or *stemming*, your running will be sufficiently safe, fast, and in particular *effortless*, to be called second-rate.

When you can manage most of your run with-

out either *falling, stopping, stemming, or turning*, you may be quite pleased with yourself.

The last sentence suggests a further word of advice.

It is seldom reasonable to feel very proud of one's running, but it is often the greatest help to *pretend* to do so.

If after taking all possible pains to learn any manœuvre you still find a difficulty in doing it, try the effect of imagining yourself rather a desperate fellow—a careless, skilful, dashing person who has done this sort of thing all his life and thinks nothing of it. You will very likely find that this acts like a charm, and that it was only the stiffness that comes from over-carefulness which prevented you from succeeding before. A certain amount of "side," in fact—whether natural or assumed—is really an excellent thing. Most good performers *talk* of their running—perhaps sincerely—with becoming modesty, but they seldom show much sign of this modesty in their *actions* when ski-ing—evincing, as a rule, a healthy self-confidence which might almost be mistaken for a desire to show off.

In the above series of "Don'ts" I have not included "*Don't use the stick*," because I trust it would never enter your head to do so. I

might however have said, "Don't be afraid of leaving your sticks at home," for unless you want to race uphill or on the level you can easily dispense with them, and to do so occasionally will prevent you from getting into the slovenly habit of prodding with the inner stick at the end of every swing. Not that this prodding need be considered a very serious crime, for as long as a stick is used with one hand for *pushing* and not with both for *pulling*, no great harm will be done to the style. But this prodding is a slight waste of energy, and therefore the tendency to do it should be checked. To go without a stick at all occasionally is the best possible way to cultivate a perfectly free and effortless style, not only of running *down* a hill, but of climbing *up* it.

One sometimes hears the absurd statement that to tour without a stick is "unnatural," and therefore not permissible. All ski-ing is "unnatural." If it is "natural" to carry a stick, it is still more "natural" to lean on it hard the whole time. The only real and searching test of the *skill* and *ease* of a man's running is to take away his stick altogether and see if he can run fast and steadily across any sort of country without it; and I strongly advise you to test your own running in this way from time to time.

It is a curious coincidence, if nothing more, that in Canada it is the regular thing for ski-ers to do their cross-country running without sticks, and that in Canada, *and nowhere else*, an Anglo-Saxon (Barney Reilly) has already done some first-rate jumping.

About the special dangers of ski-running a word or two may be useful. The risk of injury from falling on snow is not very great, and there is not much danger of any one but a lunatic dropping over a precipice in an unknown country, or dashing at full speed into a solid obstacle, instead of adopting the simple device of falling down before he reaches it, if he cannot manage to turn. I have never heard of anything worse than a broken leg (which is no doubt quite bad enough) resulting from a fall in snow. The kind of snow most likely to lead to injury is not hard, icy snow, as the beginner generally fancies, but deep soft snow, especially if covered by a breakable crust; for in this the skis may plunge beneath the surface, and, getting jammed, may throw a strain on the foot or leg.

But even here the runner whose style is good is not very likely to hurt himself, even when going fast, if his binding fits properly; it is the stick-rider with his feet level and skis apart

who gets the most awkward falls. In jumping, owing to the firmness of the surface, there is hardly any danger at all.

The real danger of injury in ski-running does not consist so much in the nature of the injury itself as in the fact that it may leave the runner incapable of movement in a dangerous situation.

If he is far from shelter he may be badly frost-bitten before he can be got home—therefore the more spare clothing he carries the better.

If he is alone, he will be lucky if he gets home at all—and any one who thoroughly realises this will think twice before he goes ski-ing by himself without saying where he is going.

The advantage of carrying a map and compass, and of knowing how to use them in case of losing one's way, is obvious. It is not only the mountaineer but the ordinary tourist who is exposed to this danger, for even the latter should remember that when once he is above the tree-line a snow-storm or a fog may make it impossible for him to find his way for ten yards by eye alone.

In thick snow or fog nothing is visible except a blank whiteness. When the fog or falling

snow are thin, objects which are darker than the snow (rock, trees, &c.) may be visible for some distance, but all light and shade disappears in the snow itself, all tracks, holes, and irregularities in its surface become quite invisible, and it is then impossible, in a bare tract of snow, for the runner to tell whether the ground in front of him goes downhill, uphill, or level.

Even an overcast sky causes this curious absence of light and shade ; and then, though the main landmarks may be visible, and there may be no danger of getting lost, running becomes exceedingly difficult and uncomfortable, perhaps even dangerous, for the snow on the edge of a precipice or steep drop, when seen from above, is apparently continuous with the snow at the foot of it.

In the description of equipment I have already mentioned the necessary safeguards against frost-bite and snow blindness.

Anything more than an allusion to the danger from avalanche is quite beyond the scope of this book. It is an intricate subject, about which whole books have been, and no doubt will yet be, written.

I believe that even now the conditions which produce winter avalanches are not fully under-

stood. On any open slope of more than certain steepness— 23° or so—an avalanche may start, especially after a thaw, or before the snow of a recent fall has had time to settle down. An avalanche, once started, can of course travel over a less steep slope, or even level ground. Lose no time in collecting all the information you can on the subject; for, although the ordinary tourist (not the climber) can usually avoid it, the danger is a very serious one, and you should never willingly expose yourself to the smallest risk of it. If the risk is unavoidable, make sure that you can get your skis off your feet in a moment, for if you are caught in an avalanche this is the first thing to do. The next is, if possible, to keep your head above the surface of the snow.

The ancient quip about presence of mind and absence of body is particularly applicable in a case of this sort.

I have said something about the special discomforts and dangers of the mountains and the snow, but nothing about their extraordinary beauty and fascination. If I were better fitted for the task than the ordinary guide-book writer, I might attempt a description of them; as I am not, I will spare the reader.

To some ski-runners these beauties may be of secondary importance to the sport itself. The ski-runner may even exist who looks upon climbing a mountain as an altogether exasperating, but unfortunately inevitable, preparation for a run down, and whose ideal is an artificial jumping-hill in his garden provided with a lift. I have never met him.

APPENDIX

HOW TO PRACTISE

BROADLY speaking, your object in practising should be to learn to run first *safely*, then *easily*, and then *quickly*. This is more or less equivalent to saying that you should first learn *braking*, then *turning*, and only then *free straight-running*, and that you should practise on slopes of *gradually increasing steepness* as well as in all sorts of snow.

You should, moreover, by very easy stages, learn jumping from the very outset.

You will hardly be able to follow the first part of this advice quite literally, for to learn to brake without learning something about turning, or to do either without learning to run straight at all is nearly impossible and quite unnecessary.

The following scheme for five days' practice is one way of setting to work. If it does not suit you, by all means vary it, but stick to the principle of learning every manœuvre in its easiest form pretty thoroughly before passing to more difficult ones, for this is the best way to gain confidence if you are nervous, and to steady yourself and avoid bad habits if you are inclined to be reckless.

Never think of learning to "do a Telemark" or anything else for its own sake alone, and never look on jumping as an extra.

*1st Morning.—Hard snow on a gentle slope
(10° to 15°) with level outrun.*

About 15 minutes.—(1) Level going. Hill-climbing (kick-turns, side-stepping and half side-stepping, herring-boning, &c.). This will, of course, be distributed throughout the morning practice.

About 30 minutes.—(2) Braking by single-stemming (half snow-plough); at first from a standstill in stemming position, then from a traverse in normal running position.

About 30 minutes.—(3) Braking by snow-ploughing; at first nearly from a standstill on the hillside, then on the level after a direct descent in normal running position.

About 10 minutes.—(4) Uphill *step* round to standstill from slow traverse in normal running position.

About 15 minutes.—(5) Uphill stemming turns from traverse in normal running position.

About 20 minutes—(6) Uphill stemming turns (snow-plough and lift round inner ski) on level from direct descent in normal running position.

Total, 2 hours.

*1st Afternoon.—Shallow soft snow on gentle slope
with level outrun.*

About 30 minutes.—(1) Telemark-stemming while traversing; at first from a standstill, then from a traverse in Telemark running position.

About 30 minutes.—(2) Telemark-stemming straight downhill; at first from a standstill, then on the level after direct free descent in Telemark position.

About 20 minutes.—(3) Uphill Telemark swings from traverse.

About 20 minutes.—(4) Uphill Telemark swings from direct descent.

About 20 minutes.—(5) Zigzag descent in snow-plough position.
Total, 2 hours.

2nd Morning.—Hard snow on moderate slope (20° or so).

About 30 minutes.—(1) Repeat (2) and (3) of first morning's practice. (If slope steep enough to make snow-ploughing at all difficult, substitute Telemark-stemming.)

About 30 minutes.—(2) Uphill Christiania swing from traverse ; first from a standstill, then while running in normal position.

On gentle slope.

About 30 minutes.—(3) Downhill stemming turns from a traverse in normal position.

About 20 minutes.—(4) Uphill Christiania swings from direct descent—at first from a standstill.

About 10 minutes.—(5) Uphill jump round to standstill from slow traverse.

Total, 2 hours.

2nd Afternoon.—Soft snow on moderate slope.

About 50 minutes.—(1) Repeat (1) to (3) of first afternoon's practice, running first in Telemark, then in normal position when practising the swing.

About 15 minutes.—(2) Uphill Christianias from direct descent.

About 5 minutes.—(3) Uphill jump round to standstill from traverse.

On gentle slope.

About 40 minutes.—(4) Downhill Telemarks.

About 10 minutes.—(5) Practise positions of jumping ("Sats," &c.) during a direct descent.

Total, 2 hours.

3rd Morning.—Hard snow on steep slope (30°).

About 20 minutes.—(1) Side-slipping (both traversing at various angles and straight down the slope).

About 20 minutes.—(2) Uphill Christianias from traverse.

On moderate slope.

About 30 minutes.—(3) Uphill Christianias from direct descent.

About 60 minutes.—(4) Downhill stemming turns.

Repeat (3) and (4) on *steep* slope if you can.

Total, 2 hours.

3rd Afternoon.—Soft snow on steep slope.

About 10 minutes.—(1) Telemark-stemming traverses and direct descents.

About 30 minutes.—(2) Uphill Telemarks and Christianias from traverse in normal position.

On moderate slope.

About 20 minutes.—(3) Uphill Telemarks from direct descent.

About 60 minutes.—(4) Downhill Telemarks.

Repeat (3) and (4) on *steep* slope if possible.

Total, 2 hours.

4th Morning.—Jumping.

Practise the positions first of all while running down a slope of 20° or so, not merely straightening up when making the "Sats," but springing into the air (legs straight). Then do the same at the point where an upper slope of about 20° joins a lower one of, say, 25° . Then build a low platform at the same point and practise on that.

4th Afternoon.

Short practice run—say, 1000-ft. climb.

5th Day.

Practice expedition—about 2000-ft. climb.

I do not expect for a moment that a single one of my readers will work through this course in detail exactly as I have set it down, but these suggestions may at least give him something to disagree with and rearrange.

Some further explanation of the arrangement of the first three days' practice may be a help. The idea is that on each day the beginner shall practise both on *hard* and *soft* snow (by all means let him find breakable crust, too, for his stepping and jumping round if he wants to be very thorough); that on the first day he learns *braking* and the elements of *uphill* turning on *gentle* slopes, that next day on *steeper* slopes he learns *braking*, *uphill* turns, and the elements of *downhill* turning, and that on the third he learns to *brake* and turn *uphill* and, if he can manage it, *downhill* on *really steep* slopes. Incidentally he ought to learn quite enough about *straight-running* to find that the least difficult part of his first practice-run.

The jumping and short-expedition day might very well—perhaps *better*—be taken after the *second* day's ordinary practice instead of after the *third*, where I have put it.

By cutting the *downhill* turns out of the three days' practice and learning them later, or by cutting out everything but the various methods of *braking*, the beginner can more quickly make himself efficient and safe (though of course slow) as a tourist if he is in a great hurry to become one. But however he varies his procedure, let him practise on different sorts of snow and slopes of every steepness up to 30° or so

from the very first. One mistake that nearly all beginners make is that they never practise on anything like a really steep slope, the result being that the greater part of their practice is pure waste of time, and utterly useless to them when they go for an expedition.

Finally, let me once more urge the beginner to do everything he can to make things easier for himself. One excellent plan if he is very nervous—or even if he is not—is, as Lieutenant Bilgeri suggests, to learn the manœuvres of the descent *on the level* at first, by getting under way with a few *running* steps and then stemming or turning before he loses impetus. Another plan (which should always be followed) is to try the position for every manœuvre at a *standstill*, and to make sure that it is accurate in every detail before attempting that manœuvre while running. This can, of course, also be done without skis, indoors. Indoor exercises being a pet fad of mine, I herewith suggest a few as more or less direct aids to ski-ing—if I had not been actually asked to do so, fear of ridicule would have prevented me.

(1) Place heels together and knees touching, and try to turn toes outwards until feet are in a straight line (*kick-turn*).

(2) Make as wide a straddle as possible, then try to make it wider. Turn toes in as far as possible (*snow-plough*).

(3) Place yourself in Telemark position, right foot leading, knees pressed inwards. Change with a jump to same position, *left* foot leading. Repeat quickly, bringing your feet to *exactly* the same places on the floor that they occupied before, and not letting them point outwards.

(4) Stand on tiptoe, feet parallel and touching. Squat and straighten up again repeatedly.

(5) Stand on one foot, holding the other clear of the floor; sit on the heel and rise again.

(6) Stand on one leg and move the other about in all directions.

(7) Stand with feet parallel and touching. Let yourself slowly fall forwards, saving yourself at the last possible moment by a jump with the feet together. Repeat this in all directions.

(8) Stand with feet in straight line, one in front of the other. Jump as high as you can, land, steadily balanced, on the spot you left.

(9) Practise the "Sats," both methods, also drawing up your legs in the air, saving yourself from a forward fall in each case either by dropping into Telemark position or by a jump forward with both feet together.

(10) Stand with feet parallel and touching, knees together and bent, body slightly stooping. Swing arms and shoulders, and turn head as far round to the right as you can. Reverse position sharply with a *jump*, so that feet then point to the right, shoulders and head full to left. Repeat this quickly.

If you find any of the balancing exercises too easy, try them with your eyes shut. Number (10) may not teach you the "jerked" Christiania, but is highly beneficial to the liver.





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